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# Popular Woodworking

Issue #64 January 1992

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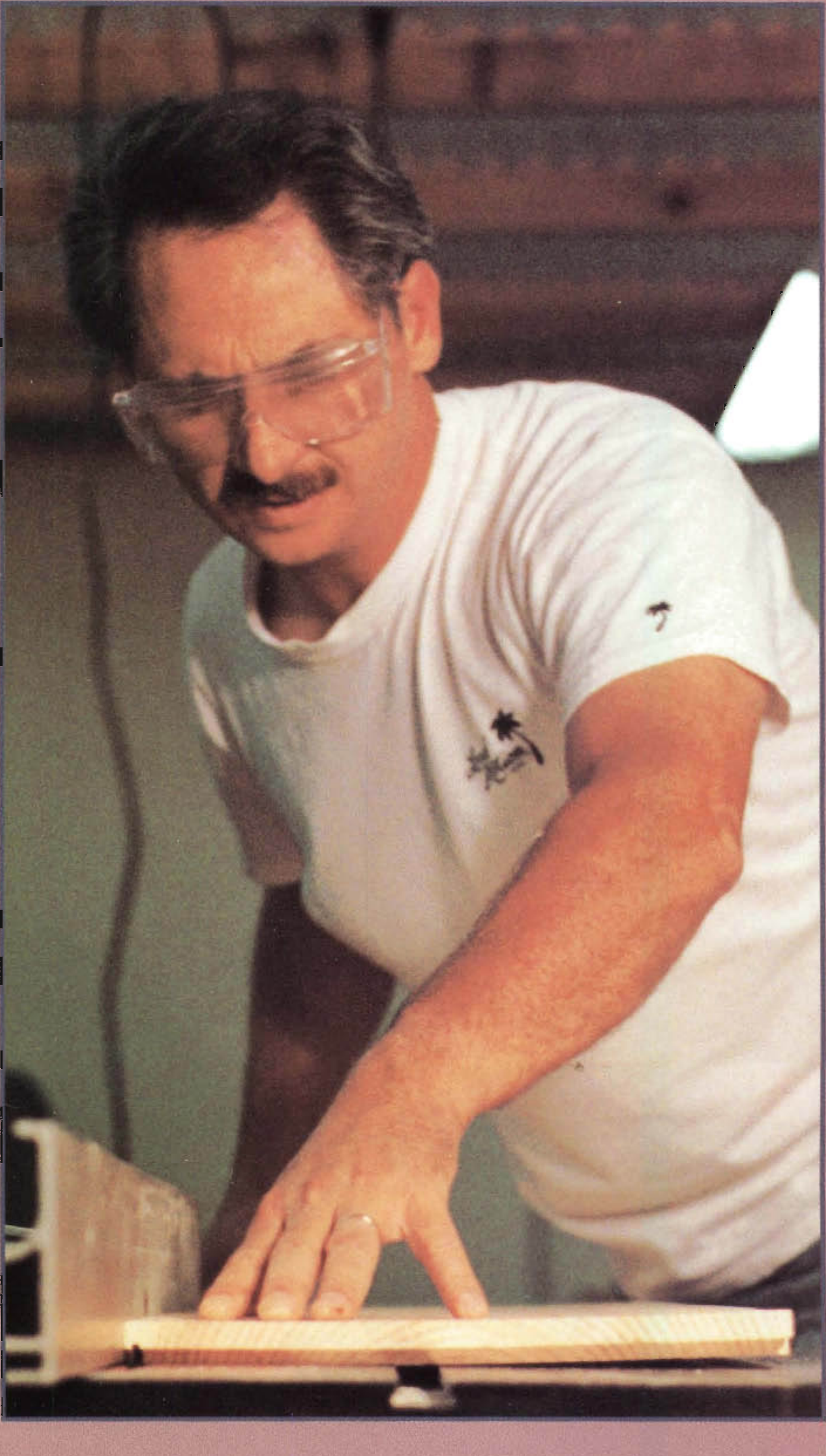

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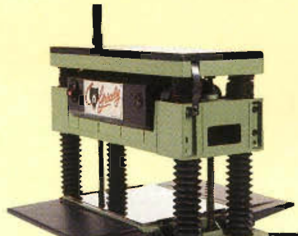

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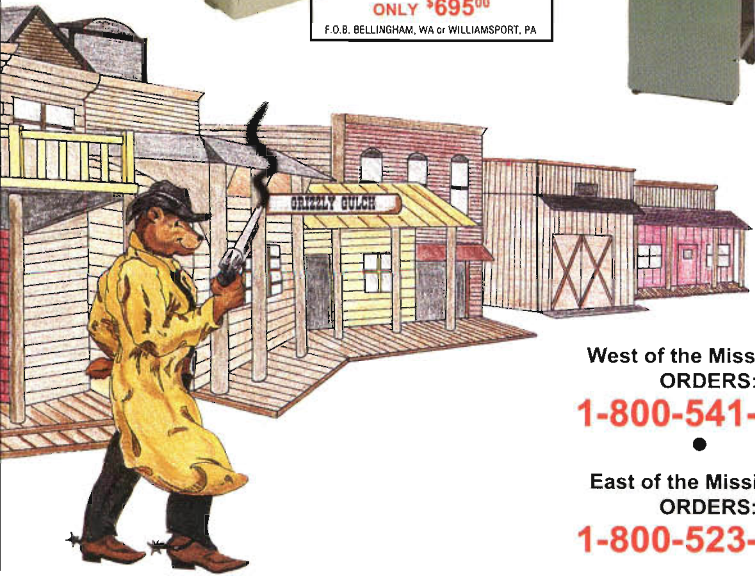

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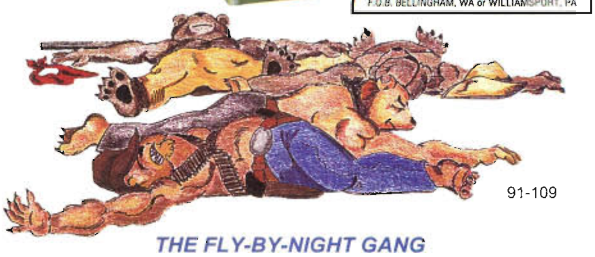

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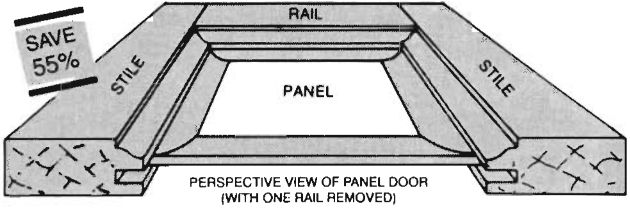

PERSPECTIVE VIEW OF PANEL DOOR (WITH ONE RAIL REMOVED)

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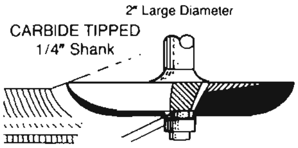

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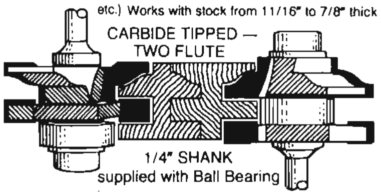

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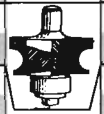
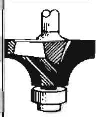
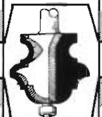
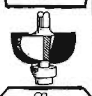
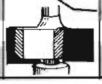
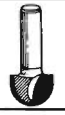
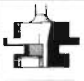
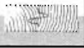
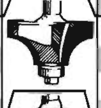
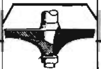
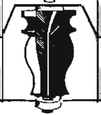
| #603 | | ¼" Spiral Cutter | | ¼" | ¾" | ¼" | $12.00 |
| #903 | | ¼" Spiral Cutter | | ¼" | ¾" | ½" * | $12.00 |
| #904 | | ⅜" Spiral Cutter | | ⅜" | 1" | ½" * | $24.00 |
| #905 | | ½" Spiral Cutter | *Proper Adaptor Will Be Supplied | ½" | 1½" | ½" | $29.00 |
| #530 |  | 3/16" **Edge Beading** | 3/16" Dia. of Circle | | ½" | ¼" | $15.00 |
| #531 | | 5/16" Edge Beading | 5/16" Dia. of Circle | | ½" | ¼" | $15.50 |
| #350 | | ⅛" **Round Over** | ⅛" R | ¾" | ⅜" | ¼" | $11.00 |
| #351 | | 3/16" Round Over | 3/16" R | ⅞" | ½" | ¼" | $11.00 |
| #230 |  | ¼" Round Over | ¼" R | 1" | ½" | ¼" | $12.00 |
| #353 | | 5/16" Round Over | 5/16" R | 1⅛" | ½" | ¼" | $14.00 |
| #209 | | ⅜" Round Over | ⅜" R | 1¼" | ⅝" | ¼" | $15.00 |
| #355 | | ½" Round Over | ½" R | 1½" | ¾" | ¼" | $17.00 |
| #655 | | ½" Round Over | ½" R | 1½" | ¾" | ½" | $17.00 |
| #656 | | ¾" Round Over | ¾" R | 2" | ⅞" | ½" | $21.00 |
| #199 |  | **Multiform Moulding** | Unlimited Patterns | 2¼" | 2" | ½" | $40.00 |
| #205 | | ¼" **Cove** | ¼" R | 1" | ½" | ¼" | $12.00 |
| #206 | | ⅜" Cove | ⅜" R | 1¼" | 9/16" | ¼" | $13.00 |
| #207 |  | ½" Cove | ½" R | 1½" | ⅝" | ¼" | $14.00 |
| #643 | | ½" Cove | ½" R | 1½" | ⅝" | ½" | $15.00 |
| #208 | | ¾" Cove | ¾" R | 1⅞" | ¾" | ½" | $26.00 |
| #231 | | 5/32" **Roman Ogee** | 5/32" R | 1¼" | 15/32" | ¼" | $16.00 |
| #232 | | ¼" Roman Ogee | ¼" R | 1½" | ¾" | ¼" | $17.00 |
| #506 | | ½" **Pattern** | Flush Trim | ½" | 1" | ¼" | $15.00 |
| #508 | | ¾" Pattern | Flush Trim | ¾" | 1" | ¼" | $17.00 |
| #366 | | ⅛" **Slot Cutter** | ⅜" Deep | 1¼" | ⅛" | ¼" | $14.00 |
| #368 | | ¼" Slot Cutter | ⅜" Deep | 1¼" | ¼" | ¼" | $14.00 |
| #204 |  | ⅜" Rabbeting | ⅜" Deep | 1¼" | ½" | ¼" | $13.00 |
| #670 | | ⅜" Rabbeting | ⅜" Deep | 1¼" | ½" | ½" | $14.00 |

| ITEM NO. | BEST CUT BEST PRICE | DESCRIPTION | ANGLE/DEPTH/RADIUS CIRCLE DIAMETER | LARGE DIA. | CUTTING LENGTH | SHANK SIZE | PRICE |
|---|---|---|---|---|---|---|---|
| #211 |  | ⅜" **Core Box** | round nose | ⅜" | ⅜" | ¼" | $10.00 |
| #212 | | ½" Core Box | round nose | ½" | 1 1/32" | ¼" | $13.00 |
| #418 | | ¾" Core Box | round nose | ¾" | ⅝" | ¼" | $15.00 |
| #213 | | 1" Core Box | round nose | 1" | ¾" | ½" | $17.00 |
| #548 | | **Lockmitre** | | 2" | ⅞" | ¼" | $32.00 |
| #214 | | ¼" **Straight** | plunge cutting | ¼" | ¾" | ¼" | $ 6.50 |
| #216 | | ⅜" Straight | plunge cutting | ⅜" | 1" | ¼" | $ 6.50 |
| #474 | | ½" Straight | plunge cutting | ½" | 1" | ¼" | $ 7.00 |
| #219 | | ¾" Straight | plunge cutting | ¾" | 1" | ¼" | $ 9.50 |
| #779 | | ¾" Straight | plunge cutting | ¾" | 1½" | ½" | $10.00 |
| #462 | | ½" **Bull Nose** | ½" Dia. of Circle | | ¾" | ¼" | $16.00 |
| #464 | | ¾" Bull Nose | ¾" Dia. of Circle | | 1" | ¼" | $21.00 |
| #764 | | ¾" Bull Nose | ¾" Dia. of Circle | | 1" | ½" | $21.00 |
| #545 |  | **Tongue & Groove** | Straight | 1⅝" | 1" | ¼" | $29.00 |
| #845 | | Tongue & Groove | Straight | 1⅝" | 1" | ½" | $29.00 |
| #546 | | Tongue & Groove | Wedge  | 1 3/16" | 1" | ¼" | $29.00 |
| #846 | | Tongue & Groove | Wedge | 1⅝" | 1" | ½" | $29.00 |
| #450 |  | ⅛" **Beading** | ⅛" R | ¾" | ⅜" | ¼" | $11.00 |
| #233 | | ¼" Beading | ¼" R | 1" | ½" | ¼" | $13.00 |
| #454 | | ⅜" Beading | ⅜" R | 1¼" | ⅝" | ¼" | $15.50 |
| #455 | | ½" Beading | ½" R | 1½" | ¾" | ¼" | $17.00 |
| #500 | | ⅜" **Flush** | **Trimming** | ⅜" | ½" | ¼" | $ 7.00 |
| #501 | | ⅜" Flush | **Trimming** | ⅜" | 1" | ¼" | $ 7.50 |
| #503 | | ½" Flush | Trimming | ½" | 1" | ¼" | $ 8.50 |
| #221 |  | ½" Flush | Trimming | ½" | 1 3/16" | ½" | $ 8.00 |
| #558 | | **Thumbnail** | | 1 3/16" | ⅜" | ¼" | $18.50 |
| #858 | | Thumbnail | | 2½" | ¾" | ½" | $35.00 |
| #579 |  | **Molding Plane** | | 1⅛" | 1¾" | ¼" | $31.95 |
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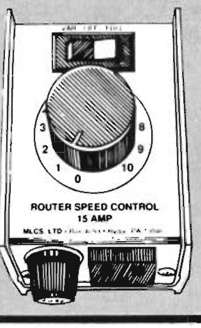

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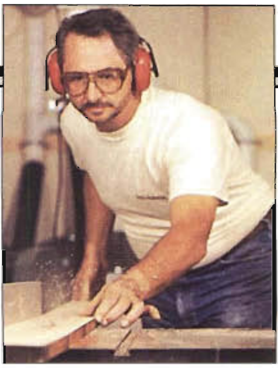

New Assistant Editor Rob Cook cuts into a plank of cherry (or is it maple?) to make Ward D. Paley's "Hexagonal End Table" featured on page 55. This challenging project was Rob's first assignment upon joining our staff—his trial by fire, and it turned out beautifully. Designing the mandrel for turning all six legs simultaneously wasn't a problem, but it wasn't until he applied the finish that Rob discovered his cherry table had maple legs. We've decided that the two–tone effect makes it look even nicer...

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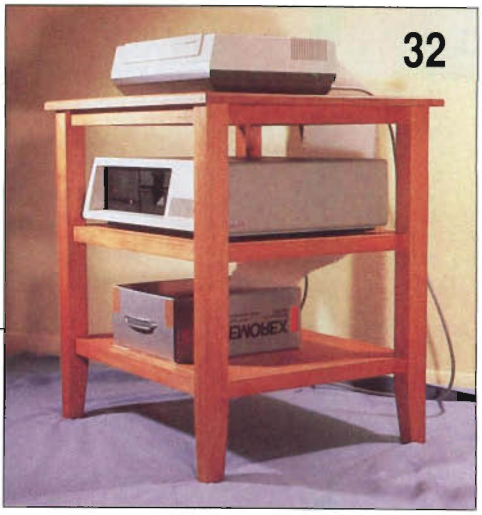
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# Clear Cuts

Back in Issue #62 I wrote a *Wood Types* article about Douglas fir. Since then I have learned some things I thought I'd share with you—things you might have already known. Some of these things *I* already knew, but I had to learn them again.

I didn't know that clear, vertical–grain Douglas fir is available in a veneer. I had learned a lot about the wood in the process of writing that article. I learned even more using the traditional house–framing material in an untraditional application–my kitchen cabinets. But I was surprised to discover a veneer of this softwood.

I discovered the veneer as the result of another lesson I learned while building the cabinets: form must follow function. Yeah, I knew this already, but I tested it and learned it again.

I had designed an upper cabinet that was in three sections. The center face frame sat back 2" from the face frames on either side. It was let into a groove in the sides of the two adjoining cases. I had spent time visualizing the routing of these two panels (essentially the sides of two separate boxes) to accept the face frame and a top and bottom. I knew it would look good and that it would be fun to build. I visualized cookbooks stored in the offset center cabinet and ordered some leaded glass panels for the doors.

The trouble is, this cabinet was to be located over the stove. The center section I built came down to within 17" of the burners. In my town, building code says combustible material is to be 30" away. My Beloved, who works for the city Building Department, would have told me this before we hung the cabinet on the wall, but I hadn't told her what I had in mind.

So anyway, when I took the cabinet down and cut it apart, I was lucky enough to learn that you can get clear, vertical–grain Douglas fir as a veneer.

Another thing I've learned since writing that article is that the darker, harder lines in a wood's grain are called latewood, while the lighter, softer section between these lines is the earlywood. Plants grow more slowly at the end of the year, so the annual ring gets darker and denser. When describing the grain, I said that the contrast between the *phloem* and the *xylem* created a sort of pin–striped effect. Actually the **phloem** is "bark," and **xylem** is "wood."

From that lesson I learned that you shouldn't throw around technical terms when you don't know how. Why use them at all, if you can use words like earlywood and latewood?

Anyway, my pin–striped veneer nicely covered the damaged panels on the two cabinets that now hang on either sideof the stove. I exposed the edges of the face frames so the cabinets look right. The glass doors that were to enclose the now non–existent center section will be used for a corner hutch in the dining nook. Form can have a different function.

David M. Camp

# Letters

**We welcome your comments, pro or con, about articles we publish. Send your letters to: Editor, *Popular Woodworking*, 1320 Galaxy Way, Concord, CA 94520. Letters may be edited for publication.**

## Informed Consumer

Thanks for your article on Random Orbital Sanders (*Tool Talk*, Issue #62). With the foreknowledge it gave me, I was able to pick up a Wen Model 15 orbital sander for $28.88 plus tax. No, it's not a Bosch as you said, but who could pass up such a deal? Thank you for your September issue. Keep up the good work in all departments.

Vic Bohlin, Onalaska, WI

## Make Like a Banana

Regarding the Split–Ring Bowls project in Issue #62: can rings be made using a parting tool on the lathe instead of using the split–ring method? Please advise what type of parting tool would be best suited.

James L. McDonough, St. Paul, MN

***The author replies:*** *It is possible to cut rings on the lathe and then glue them up in a stack for turning. I don't often do this for reasons I will explain shortly, but if you wish to experiment, mount and true up a disk on the lathe and cut the rings with a parting tool. I have one that is flat on the top and tapered to the bottom edge that is reasonably stable.*

*Mark the tool rest so you cut the rings at a 45° angle. Cut the outside ring first and then move towards the center, parting and catching each ring as you go. As you approach the center you may increase the lathe speed slightly.*

*Why don't I do it this way? It's tricky cutting and catching the rings without breaking one, and the process is slower than the split–ring technique shown in the article. Even a narrow parting tool removes more material than a band saw blade and that makes the bowl blanks thinner. As the bowl blanks become thinner, your final shapes become more standardized. Furthermore, I like the multitude of joint de-*

*signs and the opportunity to mix wood types provided by the split–ring technique.*

*Bill Bigelow, Surry, NH*

## One Project–Two Errors

In the September issue of *Popular Woodworking* (#62) there were full–size PullOut™ Plans for a Deacon's Bench. On page 21 of that issue, the cutting list called for two sides at 3/4" X 11 1/4" X 29 1/2" I cut the stock to size and laid the pattern on top and it was 30 7/8" long. I had to go purchase more lumber to get the right size.

I enjoy your magazine but these kinds of things turn me off.

John E. Osbaugh, Greencastle, PA

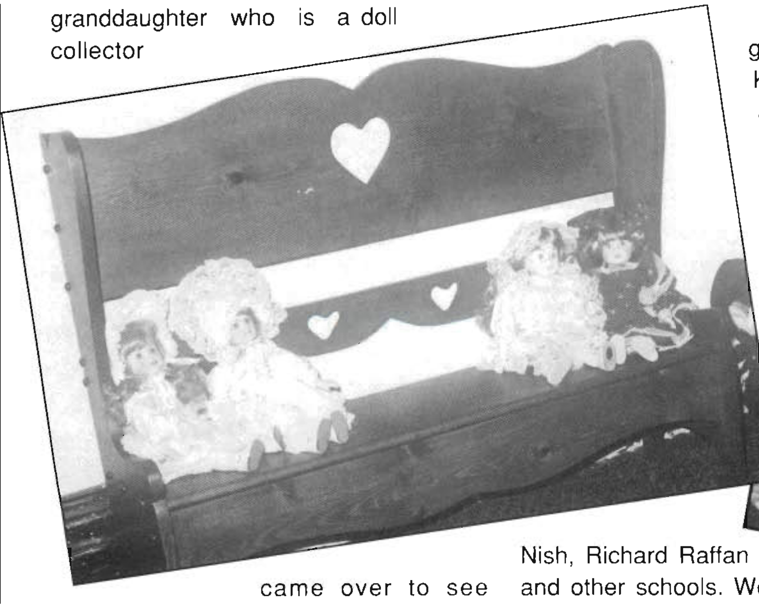
I believe there is a mistake on the cutting list for the Deacon's Bench project in the September issue. If you cut a 1/4" dado and rabbet for the back (B) and seat (C) as shown, wouldn't the brace (D) have to be 1/2" shorter?

Robert Stauble Sr., Taylorsville, KY

*You gentlemen are both correct; we got careless. Sorry.—The Editors*

## Same Project–Different Version

Not long after I received my September issue, I went to my shop and laid out both Deacon's Bench projects. When my granddaughter who is a doll collector came over to see them, she said the space between the seat and the back brace on the large version was too wide and her dolls would fall out the back. As you can see from these photos, I added an extra brace to the back which worked out real well.



Beryl Geren, Portage, MI

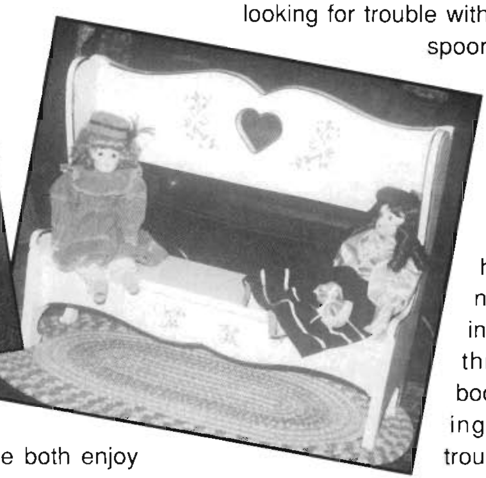
## What Sexism?

With dismay I read the letter in *PW*#63 from Karen Swayze on "The Family Garage" (*Out of the Woodwork, PW*#62) and am at a loss to find the "sexism" or "sexual discrimination" alluded to by Ms. Swayze. I even went to the trouble of rereading the piece by Jim Kucera, and I am still at a loss to understand the criticisms.

In addition to the humor about the problems of "Garage" vs. "Workshop," there is a lot of sound advice. The initial purchase of good (expensive) tools pays off in the end. The error of trying to buy one machine to do the work of many is a folly not many repeat.

I have passed through the problems Mr. Kucera discussed in my early woodworking years and recognize many of the tactics employed to identify the garage as "My Shop" with some spousal resistance. Now, with sixty years of woodworking experience behind me, my second wife and I enjoy our woodworking in a 2000 square foot shop in the bottom of our house. The garages are separate and large, to accommodate cars.

My wife and I are graduates of the Ian Kirby, Tage Frid, Sam Maloof, Dale Nish, Richard Raffan and other schools. We both enjoy turning and woodworking for pleasure. We do not sell, but there is a great demand for our work.



Perhaps when Ms. Swayze has gained experience, she will appreciate Mr. Kucera's efforts and humor. I sincerely hope her comments do not *influence* the content of your very fine magazine.

Robert J. McNeil, M. D., Cambria, CA

I seldom write to magazine editors of any type—whether I agree or disagree with an article. But when "Molly Yardism" rears its ugly head and a "Trouble Seeking Feminist" goes out of "Its" way to bring politics into a perfectly good and wonderful publication that is dedicated to woodworking, I must speak out against such petty tripe!

If "It" doesn't like the articles that are written because they appear to "It" to be sexist, then leave the whole woodworkers' magazine alone. "It" needs to stay in the kitchen and bake cakes and cookies and leave the sawdust making to us men.

Please understand. I am well aware that there are some *excellent* women woodworkers. From pictures I've seen of their work, would that I were just *half as good!* Furthermore, if memory serves me correctly, didn't a woman invent the circular saw blade? [*Editor's Note: Can anyone confirm this?*] I am not in the least bit opposed to women making sawdust any more than I am opposed to a man enjoying cooking or sewing. What I am opposed to are those people who go out of their way looking for trouble. I discovered a long time ago, that if a person goes around looking for trouble with a long–handled spoon they will usually find it!

Let's lighten up just a bit and learn to laugh at ourselves and to see humor for humor's sake and not be so everlasting critical of everything and everybody. Here's to making sawdust, not trouble!

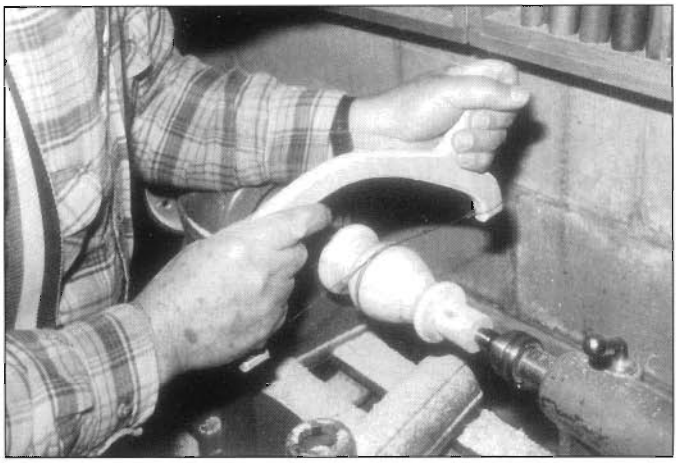
Kenneth D. Wainscott,
Kingfisher, OK

# Tricks of the Trade

**Tricks of the Trade shares readers' tips for making woodworking tasks easier and safer. Send yours to Tricks of the Trade, c/o Popular Woodworking, 1320 Galaxy Way, Concord, CA 94520. We pay $25 for each trick we publish. In this issue, we've devoted the entire column to tips by Alice and Robert Tupper, husband and wife woodworkers in Canton, South Dakota.**

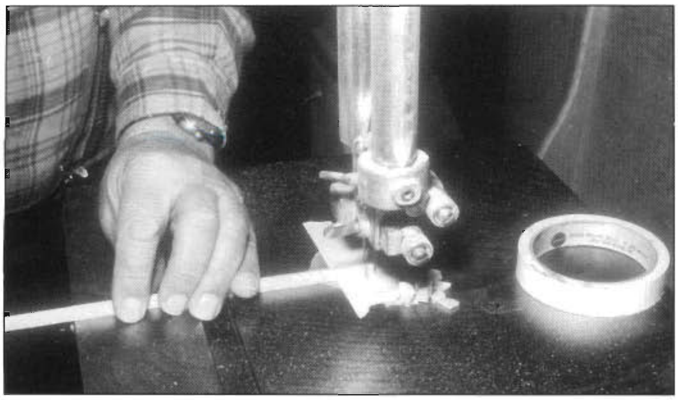
## Burn–In Frame

You can burn in decorative lines on lathe turnings by holding a fine wire against the spinning wood. We use a shopmade plywood arch to hold the wire. It measures 10" across the opening. The wire is tied in saw kerfs on each end of the frame, and the handle on the far end makes it easy to grasp and hold steady. Run the lathe at medium speed and hold the wire at right angles to the turning at the point where you want the line. Friction heats the wire to burn in the line in just a few seconds. The resulting lines are crisp and sharp.



## Tape Insert

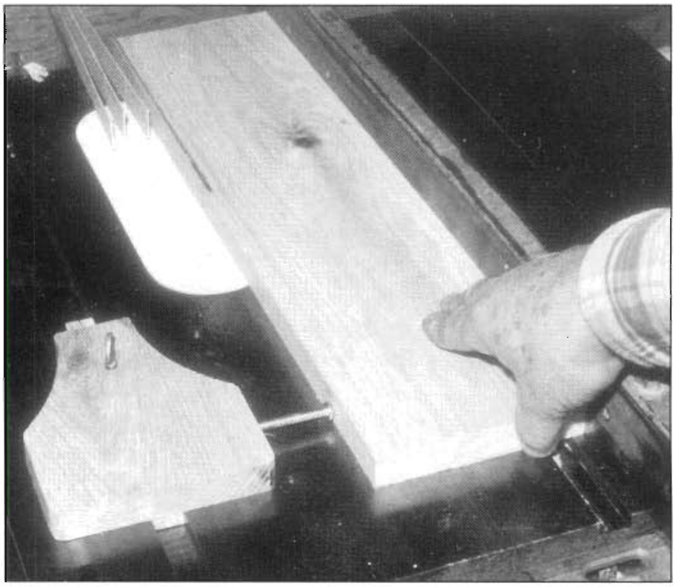
Band saw table inserts sometimes get chipped and allow small trimmings to drop partway in and catch the stock on the next pass. A piece of masking tape across the insert on each side of the blade will keep the little pieces from dropping down and plugging the work area.



photos by the authors

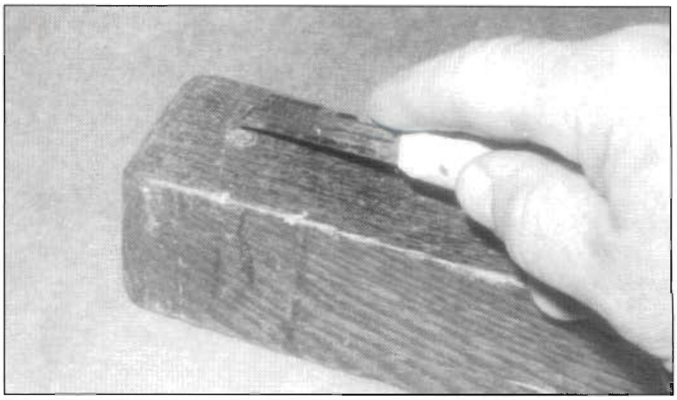
## Veneer Cutting Guide

This adjustable jig makes uniformly thin strips of wood easy to cut. Hardwood cut to the shape shown in the photo holds a ¼" X 3" round head stove bolt in a threaded hole in one side. A thumb screw threaded through the top of the hardwood block and into an undersize hole in a slotted wood strip riding in the miter gauge slot keeps the block from sliding. Slot the strip to within 2" of the near end, and glue it to the block only at the near end. Turn the head of the bolt on the side with a screwdriver to adjust the thickness of the veneer strips. Move the rip fence so it holds the stock against the bolt head for each cut. The strips will be uniform, won't bind between the blade and fence, and won't fall through the table insert slot.



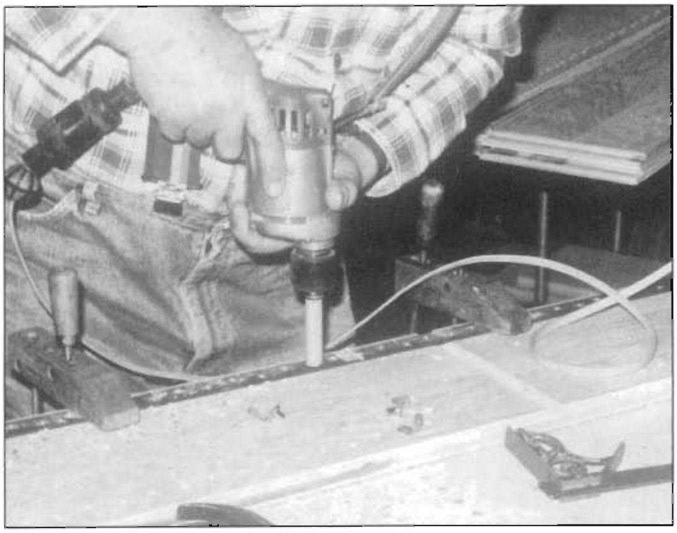
## Slot Cleaner

Make a screw slot cleaner from an old hacksaw blade. Break off about 4" of the near end of the blade—the teeth will still be quite sharp. Make a handle from a 4" length of ⅝" dowel shaped to a chisel point. Cut a kerf in the end to take the blade and two rivets. We use lengths cut from 6d finish nails and peened over for rivets. The blade works great in getting out varnish, paint and dirt from screw slots so the screwdriver can get a good grip.



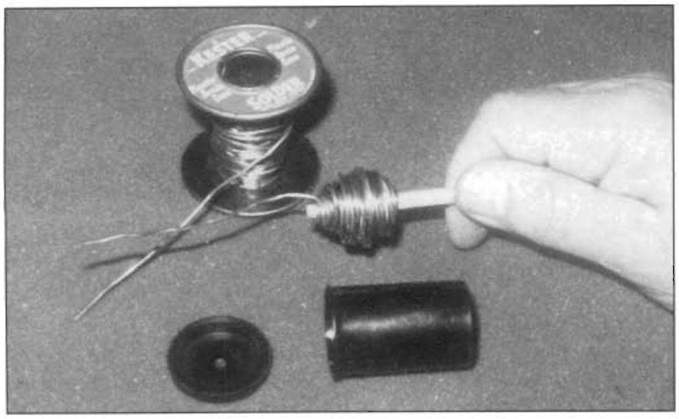
## Shelf Support Drilling Guide

Need to drill a long series of holes for shelf supports? Make this guide from a ⅛" X 1" X 39" piece of strap iron. Draw a pair of parallel lines, ¼" apart and centered, down the length of the strap. Draw perpendicular lines across them, spaced 1" apart. Use a center punch to mark hole positions on alternate sides of the centerline, and drill the 25⁄32" guide holes. Alternating, off–center holes will be easier to locate later when you're positioning the shelf supports. Also drill 1⁄16" holes directly on the centerline, 1" from each end and in the center. Use these holes to take ¾" X #19 brads to keep the guide from slipping while you're applying clamps. When you move the guide, use these holes to re-align it. To control the depth of the holes, make a bit stop from a piece of ½" dowel. A 25⁄32" drill bit extending 11⁄16" leaves a hole just over ½" deep to take the shelf supports.



## Solder Holder

A 35mm film can makes a handy holder for fine solder. Wind a supply of the solder around a ¼" dowel. Then remove the dowel and pull the end from the center hole. A punched or drilled hole in the film can cap keeps the solder under control. Pull out a short length and use the can as a handle. The solder is easier to use and takes up less space in your tool box.



## Soda Straw Pipette

A soda straw can transfer small amounts of stain or paint when mixing special shades for a small job. Mark evenly spaced lines on the straw to record the amount of liquid transferred.

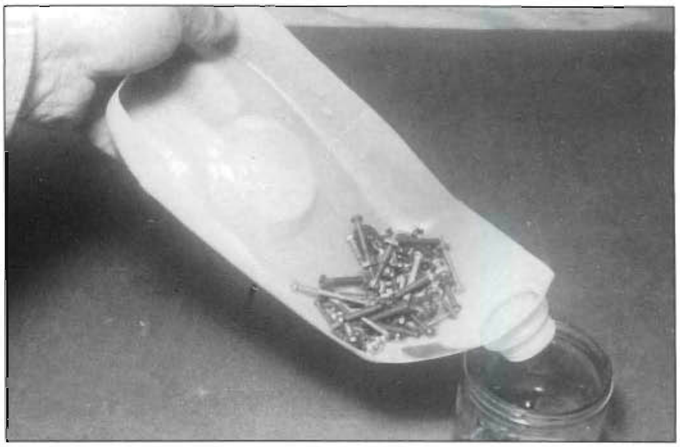
Set the straw in the finish. A finger on the end holds the finish in the straw, and a slight movement of the finger lets air in so the finish runs or drips out. For precise control of the drops, hold the straw on its side.

## Waste Can

Parts of two 5–gallon tin cans make an excellent waste can for oily finish rags. Cut around the side of one can just above the bottom with a hacksaw. Since many 5–gallon cans are designed to stack on each other, the bottom of one can can become the top of the other. Cut out the top of the second can inside the rim with a fine–toothed metal cutting blade in the saber saw. A metal handle on the lid and a coat of red paint completes the job. The cans are metal, and the lid fits close to hold down air movement and eliminate spontaneous combustion.

## Sorting Funnel

You can make a handy tray for sorting small items by cutting down the sides of a plastic milk or juice bottle. The top opening makes a natural pour spout for returning sorted items to their storage containers.

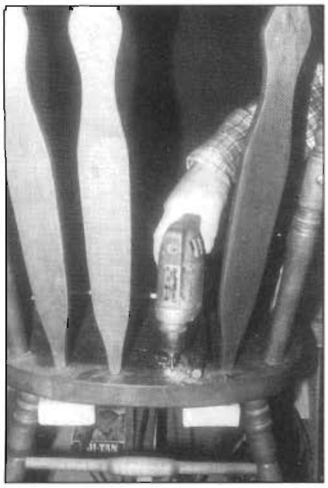


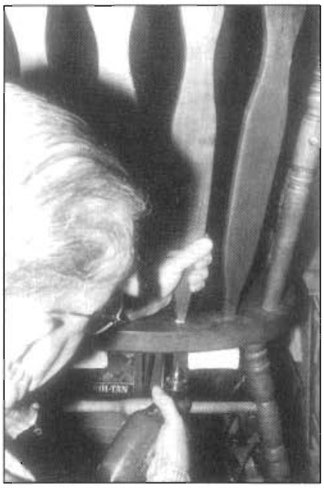
# Tricks of the Trade

continued

## Chair Back Repair

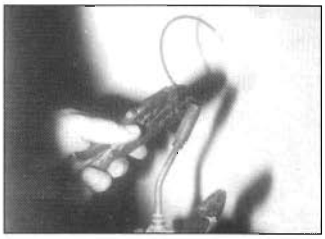
Broken slats in the back of a wooden chair must often be repaired by taking the back apart and making a new piece. But if the break is near the seat, you can repair it by drilling a pilot hole through the seat as shown in the photo for a long wood screw. Center the drill bit in the broken tenon and in line with the other slats. Then hold the slat in the proper position and drill the anchor hole from the bottom up. We repaired the chair slat shown with a 4" X #8 screw after applying glue and drawing the slat down tight. We've repaired many chairs this way, and none have been returned for failure to hold.

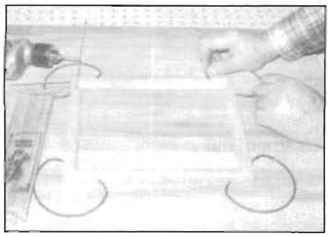


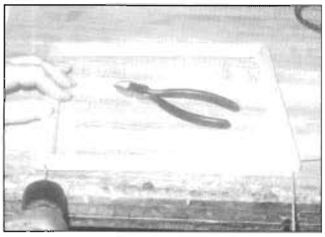


## Spring Clamp

Broken seat coil springs can be converted into spring clamps suitable for picture frames and the like. Cut off the larger coils and grind their ends so both are sharp. Then form them into ¾ of a circle. We heated the circles about 1" from the end and bent these points about 90° to the inside. Cool the coil in water before the heat travels to the point. After gluing up our frames, we spread the spring (it takes two hands) and let the points grab on the corners. After the glue has set, we dowel the corners with lengths cut from bamboo skewers.





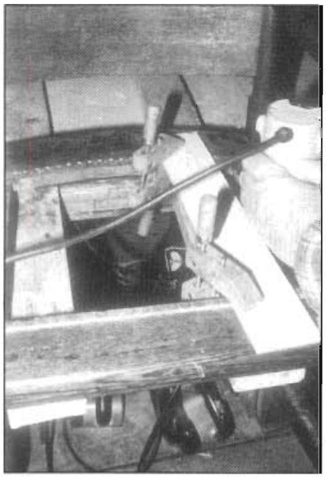


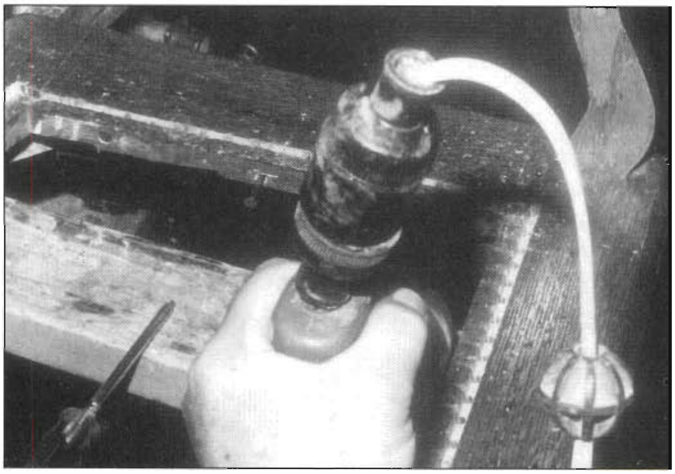
## Sorting Funnel

You can make a handy tray for sorting small items by cutting down the sides of a plastic milk or juice bottle. The top opening makes a natural pour spout for returning sorted items to their storage containers.

## Cane Change

If you have an old chair whose handwoven cane seat has worn out, you can replace it with less expensive machine–woven cane. Cut a 5⁄16" deep groove with a router and a ¼" bit as shown in the photos. We use a small laminate–trimming router and a template to make the groove. This tool is usually small enough to complete the job without running into the back and arm supports. Finish the groove near the supports with a chisel. Then reinforce the seat frame by installing 1¾" X #8 screws through solid wood just below the groove. Space them between 2½" and 4" apart. You're now ready to cane the chair using machine–woven cane, and save perhaps ⅔ the cost of handwoven cane.





## Natural Mixing Bowl

Keep a few beverage cans in the shop to use as mixing bowls. The concave bottom makes a good bowl for small batches of stain, epoxy or filler. Clean the cans for reuse or recycling. PW

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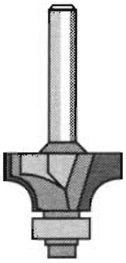

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| C1177 | 1" | 1/2" | 2" | 1/4" | $11.00 |
| C1179 | 1-1/4" | 5/8" | 2-1/4" | 3/8" | $14.00 |

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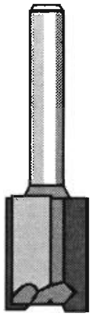
| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | RADIUS r | SALE! |
|---|---|---|---|---|---|
| C1184 | 1" | 1/2" | 2-1/4" | 1/4" | $11.00 |
| C1185 | 1-1/8" | 1/2" | 2-3/8" | 5/16" | $12.00 |
| C1186 | 1-1/4" | 5/8" | 2-1/2" | 3/8" | $14.00 |

## Double Fluted Straight Bits



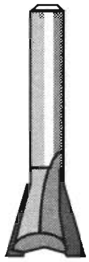
1/4" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | SALE! |
|---|---|---|---|---|
| C1001 | 1/4" | 3/4" | 2" | $6.00 |
| C1002 | 5/16" | 11/16" | 2" | $6.00 |
| C1003 | 3/8" | 3/4" | 2" | $6.00 |
| C1004 | 1/2" | 3/4" | 2" | $8.00 |

1/2" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | SALE! |
|---|---|---|---|---|
| C1008 | 1/4" | 3/4" | 2-1/2" | $6.00 |
| C1009 | 5/16" | 3/4" | 2-1/2" | $6.00 |
| C1010 | 3/8" | 3/4" | 2-1/2" | $6.00 |
| C1011 | 1/2" | 1-3/16" | 2-1/2" | $8.00 |

## Dovetail Bits 2 Flutes



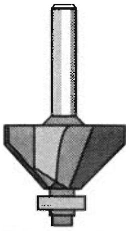
1/4" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | ANGLE a | SALE! |
|---|---|---|---|---|---|
| C1068 | 3/8" | 3/8" | 1-3/4" | 8° | $5.00 |
| C1069 | 1/2" | 1/2" | 1-3/4" | 14° | $5.00 |
| C1071 | 3/4" | 11/16" | 2-1/8" | 14° | $7.00 |

1/2" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | ANGLE a | SALE! |
|---|---|---|---|---|---|
| C1074 | 1/2" | 1/2" | 2-1/4" | 14° | $5.00 |
| C1076 | 3/4" | 7/8" | 2-1/2" | 14° | $8.00 |

## Chamfer Bits 2 Flutes



1/4" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | SALE! |
|---|---|---|---|---|
| C1129 | 1" | 7/16" | 2" | $12.00 |
| C1130 | 1-3/8" | 5/8" | 2-1/4" | $16.00 |

1/2" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | SALE! |
|---|---|---|---|---|
| C1131 | 1-1/8" | 1/2" | 2-1/4" | $14.00 |
| C1132 | 1-3/8" | 5/8" | 2-3/8" | $16.00 |

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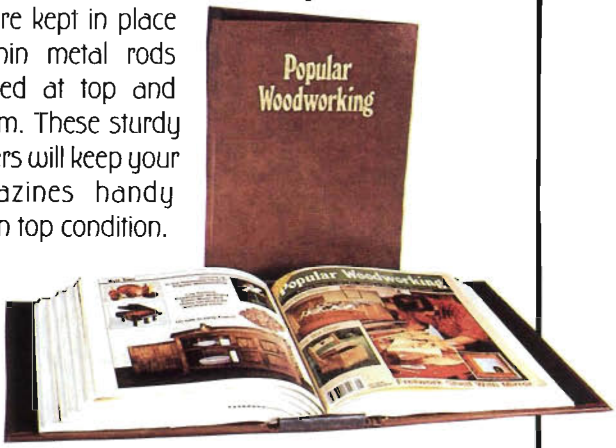

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# The Finishing Forum

by George Frank and Tom Wisshack

**The Finishing Forum is an ongoing discussion about the art of wood finishing. If you have a question or a problem to solve, we'd like to help. If you have a tip or a secret formula to share, or if you've recently tried a new product, write to: The Finishing Forum c/o *Popular Woodworking*, 1320 Galaxy Way, Concord, CA 94520. Letters may be edited for publication.**

## Sight or Scent?

I recently was given a small round extension table for my dinette. It's made of Brazilian cherry, with grain and color similar to mahogany. It has a very sweet fragrance which is supposed to last for years. Because of the location of the table, I'd like its final color to be beige rather than red–brown. Is this possible? Is there any way the fragrance can be retained without danger of warpage due to changing moisture content?

Louis Holland
Warwick, RI

*There are two ways to remove the red and make the wood blond. You can add hints of green to the stain, the filler and the final finish. This way you may be able to camouflage the red and come up with a beige–brown finish. Or you can bleach the wood. Wash it two or three times with strong Clorox, letting it dry and sandpapering between washings. Neutralize any remaining bleach by rinsing with white vinegar. If the red is gone, you're ready for staining and finishing. Peroxide leaching would surely eliminate the red, but I'm afraid it would also eliminate the beauty of your wood.*

*It's very unlikley you'll be able to retain the fragrance through the repeated washings, and it will have a tough time coming through the final finish. Perhaps if you leave the underside of the table as it is, the fragrance will be preserved. Sanding there will help. The warpage worry will be taken care of by treating the top and bottom the same, but then you'll probably lose the fragrance.*

*This is a difficult problem and you must experiment on samples, so don't hope for any easy solution.*

*George Frank*

## Waxes and Oils

I am writing in the hope that you can help me with a couple of finishing problems I'm having: first, can I, or rather would I want to put finishing wax over a hand–rubbed tung oil finish? Second, what sort of finish would you recommend for a cutting board?

---

***George Frank** is the author of* Wood Finishing with George Frank *(Sterling).*
***Tom Wisshack** is a maker, restorer and finisher of fine furniture in Galesburg, Illinois, with over thirty years' experience in woodfinishing.*

## New Finishing Products

### Woodfinisher's Pride Stripping Gels

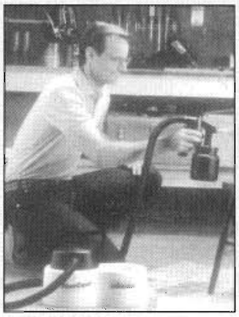
A line of environmentally friendly paint and varnish removers has been introduced by Creative Technologies Group, Inc. According to the company, Woodfinisher's Pride Stripping Gels represent a performance breakthrough in a product category dominated by brands containing physically harmful and environmentally dangerous chemicals.

Woodfinisher's Pride removes multiple layers of paint and varnish from surfaces in 30 minutes. Because of its slow evaporating action, it can be applied to large surfaces all at once. It contains no petroleum distillates or wax, which may leave difficult residues. Furthermore, it doesn't raise the grain or lift veneer from wood surfaces.

This stripper contains no cancer–causing methylene chloride, no flammable or poisonous ingredients like acetone, methanol or toluene, and is easy to clean up with soap and water.

### Wagner FineCoat™ Sprayer

Wagner Spray Tech Corporation is introducing the FineCoat™ Sprayer, a high–volume, low–pressure (HVLP) sprayer designed for fine finishes. According to the manufacturer, this new finishing tool gives excellent control with less overspray, material waste and cleanup time than conventional airless or compressor–type spray systems. It can be used with a variety of light–bodied finishes including stains, varnishes, urethanes, lacquers, shellacs, enamels and oil–based paints. Heavier–bodied materials such as latex can also be used if they are thinned.



The spray widths range from ¼" to 12" in horizontal, vertical and circular patterns. The transfer efficiency is up to 86%. In other words, of the material being sprayed, up to 86% will end up on the piece being finished.

### Minwax Polycrylic Protective Finish

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I made a cherry top for a marble base that I had, and I finished it with tung oil. The finish is beautiful, and I wondered if a wax finish would help keep it that way.

The cutting boards are from a variety of woods, including maple, cherry, oak, walnut and mahogany. I have been finishing them with olive oil, with fine results so far... It really brings out the grain patterns nicely, doesn't seem to "rot" or "sour" with age, and leaves a faint but pleasant odor.

P. S. Does every woodworker's spouse go "wood crazy" after the first project comes off the bench? My wife seems to think there is no end to my talents so I try not to disappoint her.

Chris S. Hayden
Great Lakes, IL

*To answer your first question, using finishing wax over a tung oil finish is a perfectly sound practice. It will give a bit more protection and a deeper gloss. Choose a wax that is appropriate for the job. A wax that is high in carnauba content, like Trewax, will leave the hardest finish on the wood.*

*As for your question about using olive oil as a finish for cutting boards, it is probably not a good idea. Boiled linseed oil and tung oil are "drying oils," that is they evaporate and form a film over time that is fairly durable. Salad oils, (including olive oil) are non–drying oils. They remain greasy indefinitely, and do not change chemically through evaporation.*

*Now, you may accept these results, but you should know that olive oil will turn rancid in time, even though the odor may not be as obvious as with other oils. A nutritionist will tell you that food prepared with or in contact with rancid oil depletes certain vitamins from the body.*

*A better choice would be Behlen's Salad Bowl Finish, a product that contains only ingredients approved by the Food and Drug Administration for use in contact with food. If you can't find this product locally, you can get it from Woodcraft Supply Corp. (1-800-535-4482).*

*As for your wife's mental condition, she's not really "wood crazy." She's just delighted to have you out of the house.*

*Tom Wisshack*

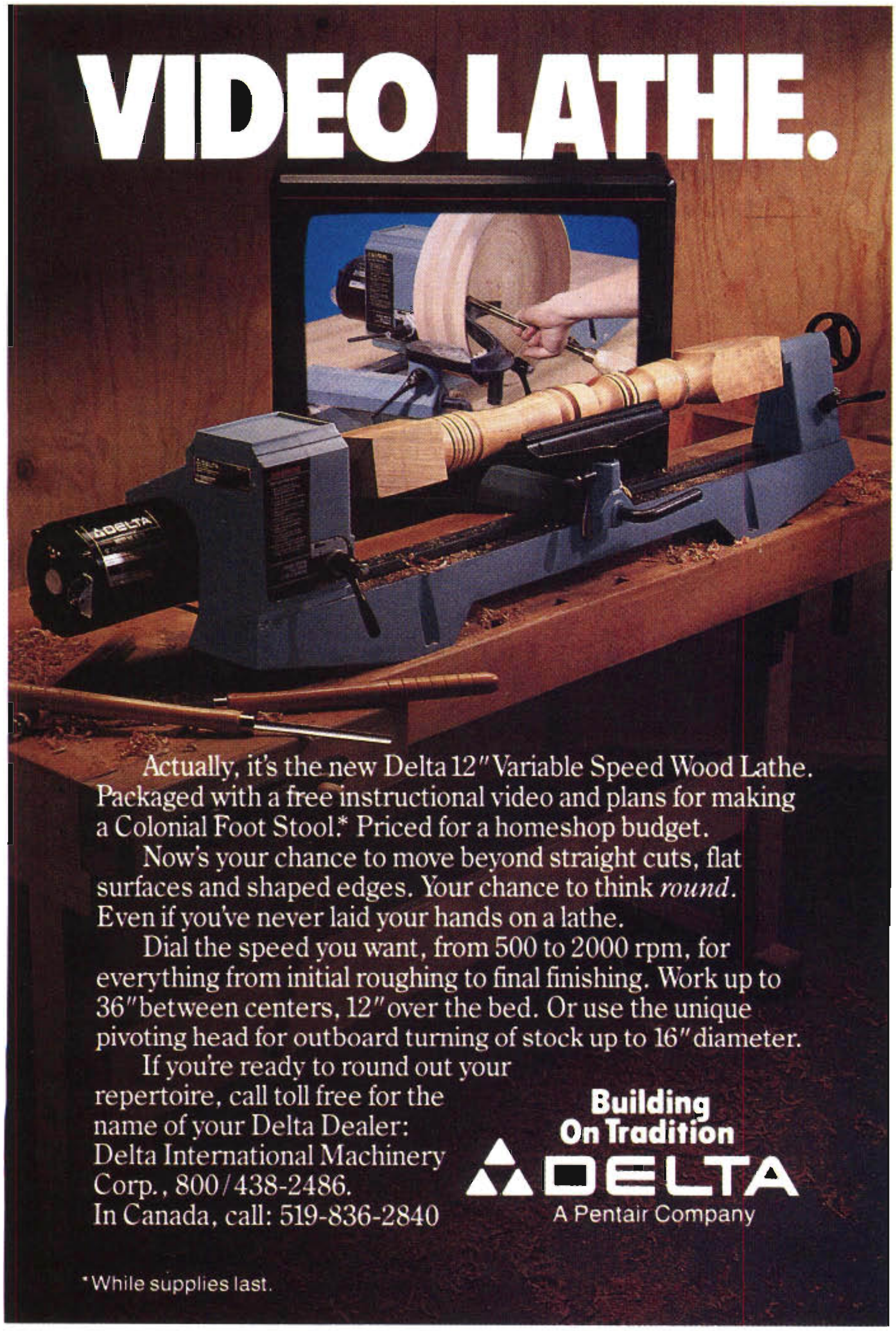
## Cloudy Cabinets

I need some information about refinishing my birch kitchen cabinets. I have a lacquer finish on them. The stiles and part of the doors around the handles are cloudy (I imagine from hands touching them) and I can't bring out the finish. Aside from that, the cabinets are like new.

Robet C. Washer
Ogdensburg, NJ

*Lacquer is not an ideal finish for kitchen cabinets, even though most all commercial cabinets are finished with it. The problem is moisture; it's inevitable in a kitchen, and it will cause some lacquers to break down over time. Since the damage on your cabinets is limited to only a few places, I'll give you a few tricks that may save you from having to refinish the entire kitchen.*

*First, you might try mixing up a solution*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*and bringing the damaged areas back to life. I have had good luck removing white marks from lacquered surfaces with lemon oil. You'll need to locate some pure lemon oil—not the adulterated version found in grocery stores. Cut the lemon oil with about one–fourth pure mineral spirits for maximum penetration and spread it onto the damaged area. Rub vigorously with the grain using 0000 steel wool. You may see the white area begin to disappear immediately. If not, try leaving the solution on for 15 or 20 minutes and then resume the rubbing.*

*If you're not getting results, spice the mixture with some boiled linseed oil at about the same ratio that you added the mineral spirits to the lemon oil. Test this concoction out on a small, unseen area first. Though linseed oil often does a fine job of removing white areas from finishes, it can sometimes soften lacquer and make it sticky. (It depends largely on how long the lacquer has been allowed to cure.)*

*If this fails, you could try the linseed oil alone, but be sure to remove all traces of it after a minute or two to avoid any softening of the finish.*

*You can make any of these solutions more effective by sprinkling the surface with pumice or rottenstone abrasive powder as you rub with the steel wool. Rottenstone is the finer of the two and will leave a high gloss. Afterwards remove every trace of the solution, and dispose of the rags properly as they're very flammable. Wipe the area with mineral spirits as a final precaution, and finish up with a coat of paste wax.*

*Finally, if all else fails, shoot a wet coat of lacquer onto the damaged area and hope that it dries clear.*

*What kind of finish would I recommend for kitchen cabinets if you were starting from scratch? A polyurethane.*

*Tom Wisshack*

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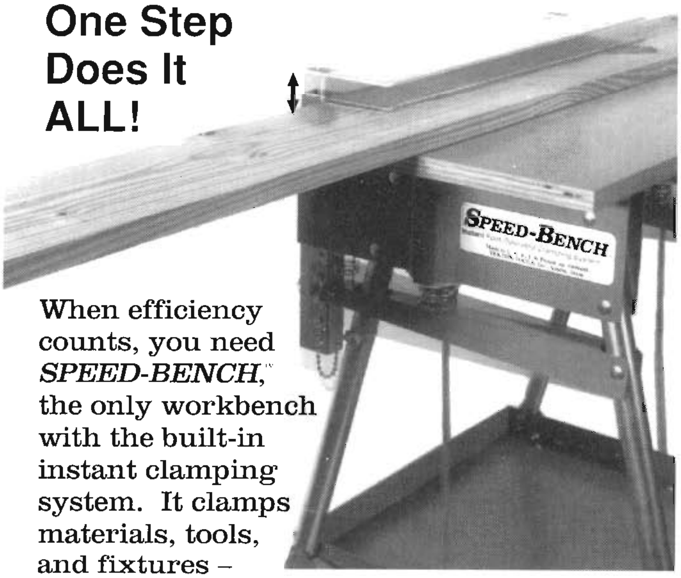

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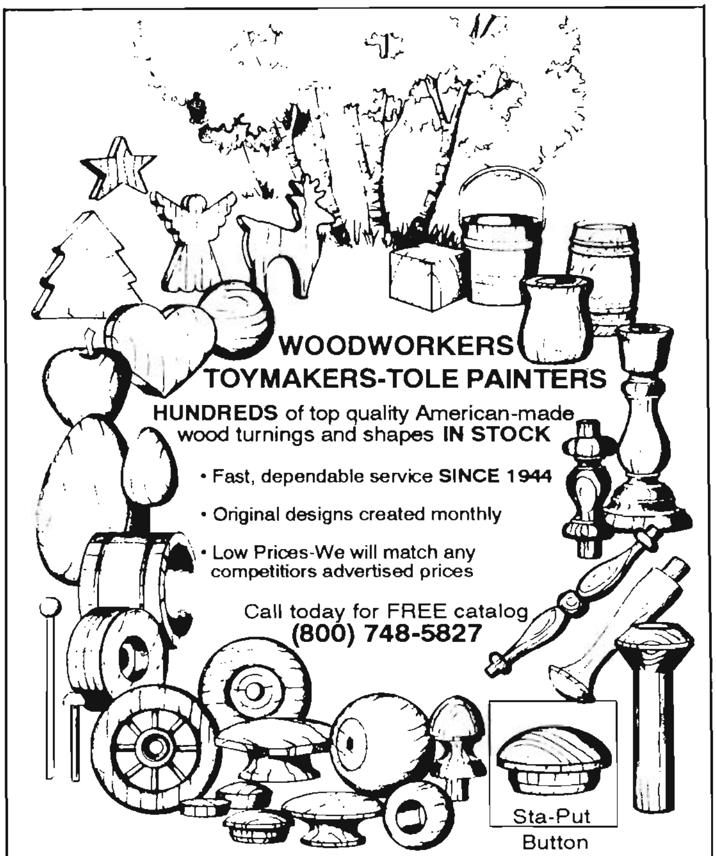

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## The Business End

**by Ken Sadler**

# Many Are Called, But Few Are Chosen

Many people are seduced by the dream of a business of their own, but few achieve success. Why? There are almost as many reasons as there are failures. But when you look below the surface, they boil down to a basic few.

Probably the most common reason for not achieving success is the lack of certain vital personal characteristics—self–discipline, confidence, and enthusiasm. You must have the discipline to force yourself to do things you know are necessary, but that you don't want to do. You must have confidence in your ability to handle and solve the problems that will confront you. And you must have so much enthusiasm about what you're doing that you can hardly contain it. Without these characteristics, ninety–nine out of a hundred won't make it.

Several years ago I was called on to help a couple of young women who were operating a sandwich shop and deli. They were bright, personable, and had a good understanding of business methods, but they were going nowhere. After talking with them several times, it became apparent that they did not really like what they were doing. In fact, it was drudgery for them. They couldn't keep this fact from showing as they waited on customers. They couldn't bring themselves to do the work of keeping proper records. The lack of enthusiasm was evident everywhere in the store; six months later they were gone and so was the business. They'd let it run down so far that when they decided to get out there was nothing left to sell.

On the material side, the most common reason for lack of success is money. Money can get you in two ways. An insufficient amount to start with can doom you. The same can happen if you put too much into fixed assets such as machinery, equipment, and buildings, and don't leave enough working capital to get you to the point where the business at least starts to break even.

I once worked for a small company that didn't have enough

---

***Ken Sadler** is a retired furnituremaker in Portland, Oregon. He also served for four years as a counselor with the Service Corps of Retired Executives (SCORE), a volunteer organization that advises small businesses through the Small Business Association.*

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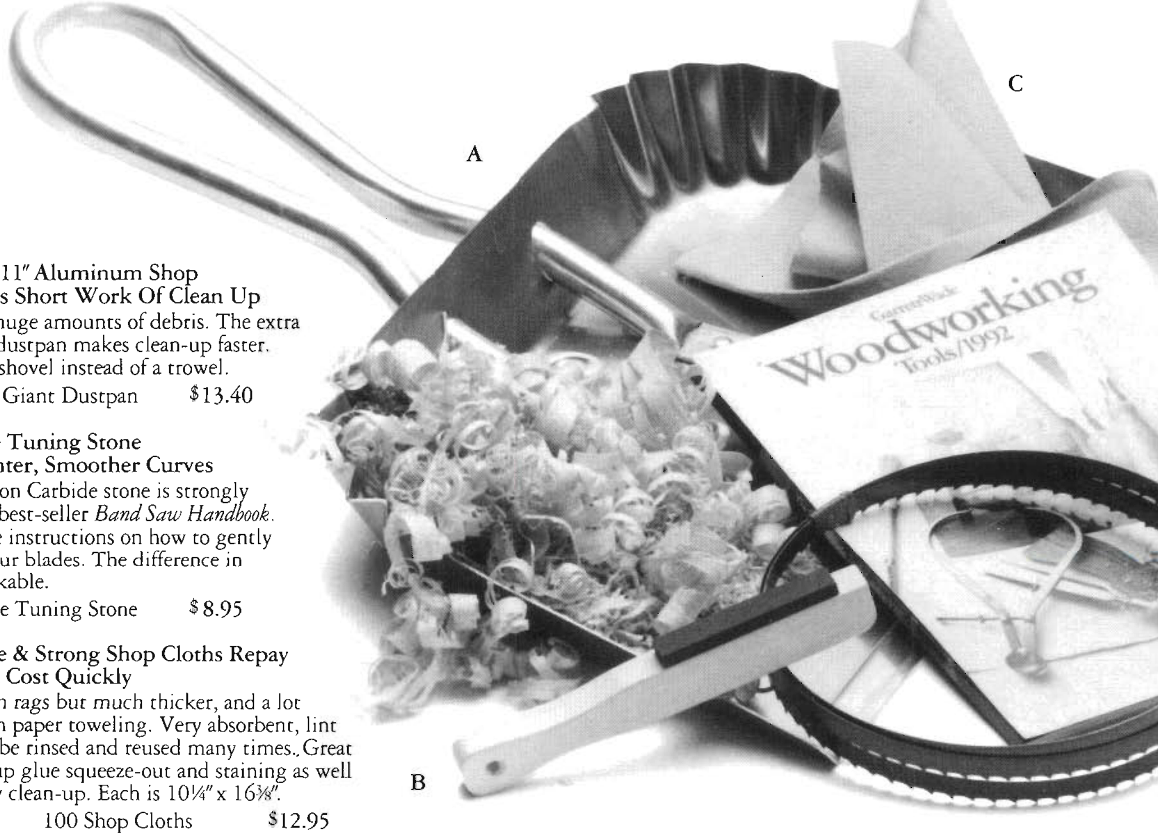

A / Giant 17″ x 11″ Aluminum Shop Dustpan Makes Short Work Of Clean Up
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| 24K03.01 | Giant Dustpan | $13.40 |
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B / Band Saw Blade Tuning Stone Helps Produce Tighter, Smoother Curves
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C / Versatile & Strong Shop Cloths Repay Their Extra Cost Quickly
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| 23K02.01 | 100 Shop Cloths | $12.95 |
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capital. It was run by good businessmen, the products were well received in the marketplace, but it didn't have enough money to increase its output beyond a certain point without borrowing. Interest ate up the profit from the additional production and at the end of the year we were right back where we started. The company could not grow—it just sat there and stagnated. To get enough additional capital to solve the problem would have cost the owner control of the company. He decided to sell out completely instead.

The second money trap is one that many new manufacturing companies fall into. They put a disproportionate amount of their capital into machinery, equipment, or buildings. Very often a small woodworking business is started by someone who likes working with machinery and building things. Some people just have an affinity for machinery—they love working with it and even just seeing it sit there. I know because I'm one of them. The trap is set when they buy tools they don't need or can't keep busy. This uses up money they'll need later to buy raw materials and pay help (or themselves) until sales grow enough to carry the load. I had a young friend in the woodworking business who told me about the wonderful wood lathe he'd just bought, and at a bargain. I said I hadn't realized that he used any turnings in his product. He said, "Oh, I don't, but this was such a bargain, and I always wanted a good lathe." A year later he folded his business for lack of money and was working for someone else.

After money comes records, or the lack of them. Without proper records you have no way of knowing what is happening to your business. The most important records are cost, sales and purchasing. If you don't have good cost records, you don't know what your products are costing you to make. If you don't know that, you can't set prices that will pay your wages and make a profit. If your prices are too low, you won't prosper. There's an old saying that wages are to live on and profits are to grow on. You must have both. Many people don't realize this and they don't charge their business with wages or salary for themselves. If they don't charge it, then it doesn't get into the costs and so it isn't in the price, and if it isn't in the price, you don't get it. Wages must then come out of profits and there's no money left for growth. The result of this is stagnation and a marginal existence.

Costs are influenced by volume and volume means sales. Sales records show the number of units that you're selling and whether that number is going up or down. If an item is not doing very well, sales records will help you decide what to do about it. I once knew a company that started making a small item from

D / "Hot Stuff" Is Great Stuff For That Quick Fix In Woodworking
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E / Wonderbar: A Simple Product That Works Fantastically Well
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F / Stainless Steel 6X Magnifying Tweezers Save Your Fingers
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G / Garrett Wade Special Furniture Wax Provides Real Protection From UV Damage
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wood. It caught on and sales grew rapidly. The owner was elated. After a while he discovered that although his sales were increasing, after paying himself a modest salary there was nothing left. He hadn't kept proper cost records. By digging, we put together enough figures to discover that he was losing money on every unit sold—not much, but enough to slowly drain away his working capital. The more he sold, the worse things got. He raised his price and began keeping good records, and the business went on to do well. Of course, records, good or bad, have no value if you don't know how to use them. That value is found in analyzing them, comparing this month's costs with last month's, comparing sales figures and watching for trends, looking for an explanation for variations that show up—the answers you find tell you what's happening in your business.

If you're not making a product that people want, then you won't be in business very long. That sounds simple, so simple that you'd think everyone would realize it. But many tend to get carried away with an idea. They tell it to their friends, who think it's great, and with that backing, they plunge into making it. The mistake is in thinking that your taste is representative of the public in general. Usually it isn't. I had a friend who was the buyer for the rug department of a large department store. Here's how he chose rugs: "Of the rugs I buy, 5% I like and would buy for my own house; 15% I would take if given to me; the other 80% I wouldn't have in my house under any circumstances. At the end of the season when I have my clearance sale, I have all of the 5%, most of the 15%, and very few of the 80%."

There are several easy ways for a small business to make a simple market survey. Not to do so before investing money in the manufacture of a new product is to court trouble. Here's a technique used in the mail order business: get the catalogs of your competitors and note the items that are in most of them. If everybody is carrying an item, then people are buying it. It's true of items sold in stores, too. Make your survey by canvassing the kind of stores that sell the type of product you have in mind.

Marketing and selling have tripped up many an entrepreneur. People tend to lump these two together and talk about them as one and the same. They're not. Marketing is bringing or sending a product to a market. It's the process by which you get goods to a place where consumers can buy them. Selling, on the other hand, is an action by which you attract prospective buyers and convince them to buy. It's important to determine your process of marketing before you contemplate the action of selling. There are numerous ways for a small business to get its product to market—through distributors, by manufacturer's representative, direct to consumer, or mail order. Some businesses use one or another of these and some use a combination, but in all cases it's necessary at the start to decide which way you're going and work out a plan. The marketing plan will determine the method of selling.

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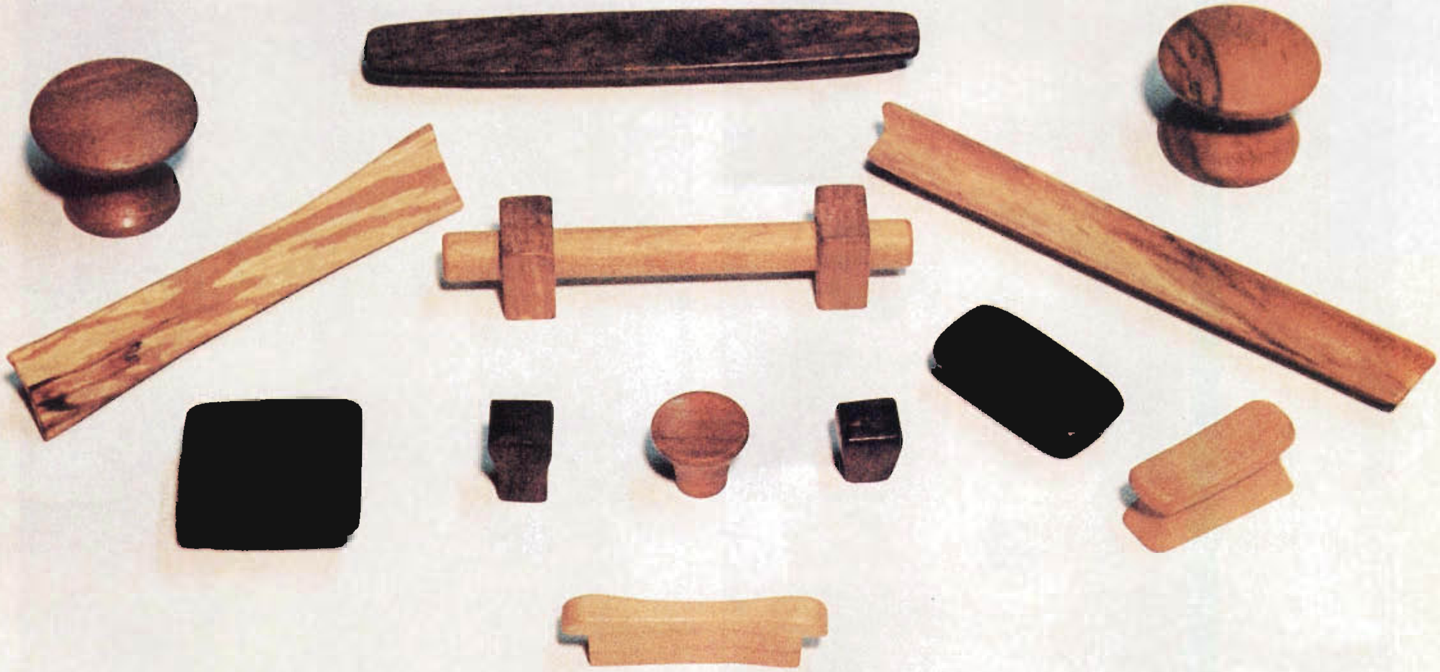
Some people just don't like selling and try to push it aside. Here is one of those situations where self-discipline comes into play. Every successful person has been a salesman whether they realize it or not. They have sold themselves and their ideas at the very least. If you really have an aversion to selling, then you're better off working for someone else in a position that does not require putting yourself or your ideas forward. This is not the place to disuss the techniques of selling. It's enough to say that if you don't do it at least passably well, your new business is not going to get off the ground. The idea that if you build a better mousetrap, the world will beat a path to your door has never been true.

Then there is the problem of volume. How many units do you have to sell? If you sell an expensive item with a large margin, you won't have to sell very many. If you sell an inexpensive item with a small margin, you'll have to sell a great many. I once talked to a woman who made salsa sauce in her kitchen, bottling, labeling and selling it through a local supermarket. She wanted to know how to build this into a business to support her and her children. She had very little money and less credit. The situation was impossible. The product was priced to retail at $3.50, the supermarket took 50%, leaving $1.75. The materials, including bottle and label, cost 75¢, leaving $1.00 to make, bottle, and sell the sauce. Assuming she did all the work herself and kept all of that dollar, and assuming she needed $15,000 a year to support herself and her children, she would have to make, package and sell 15,000 bottles of salsa per year all by herself. This illustrates the problem of an inexpensive item with a small margin.

At the other end of the scale, I have a young friend who makes furniture. He works alone, is well established, and averages about $2500 per piece for his work. He builds 30 to 35 pieces a year to order. His costs, not including his wages, run about 25% of the selling price. He sells 30% of his work through galleries that take 50%; the rest he sells direct and gets the full price. If you work out those figures it results in a net for wages and profit of around $55,000 per year. The moral of the story? Look closely at the volume price relationship of the items produced or sold by any business in which you plan to get involved.

This has been a general rundown of the main reasons why a small business can turn out to be less than your dreams had pictured. If you now have a business that you can't seem to get going, perhaps what I've said here will lead you to the answer. If you're planning to start a business, it may save you trouble later on. PW

# Get a Handle on It



### by Ken Sadler

Handles are one of the most important elements of any piece of furniture. The right handle can complement the appearance of a fine design, or it can enhance the appearance of a mediocre one. By the same token, the wrong handle can spoil the best piece. Handles can be of any shape or size, they can be of the same wood or of a contrasting wood. They can be machine–made or hand–carved. The important point is that the handles must look right for that piece.

I've never been able to get very excited about the handles and pulls sold in the craft catalogues and hardware stores; generally speaking, they are a pretty mundane lot. The kind of handles I'm going to talk about are those you create out of your own imagination.

Choosing a pull is a decision you make based on the design of the piece you're creating. Some designs will require that you decide how the handles will look early on in the project, so you can prepare the piece with material for carving. Other designs are of the applied type. With these you can often wait until the piece is built before deciding how the handle will look. I find I can get a better idea of how a pull is going to fit and look if I can refer to the actual piece of furniture. Sometimes I'll rough my ideas out of scraps; sometimes I'll form several ideas in modeling clay to help me settle on a final design. It lets you make subtle changes in shape without having to recarve.

I've included a lot of pictures here to help me describe how some handles can be made and more important, to suggest some ideas that may stimulate your imagination to create your own.

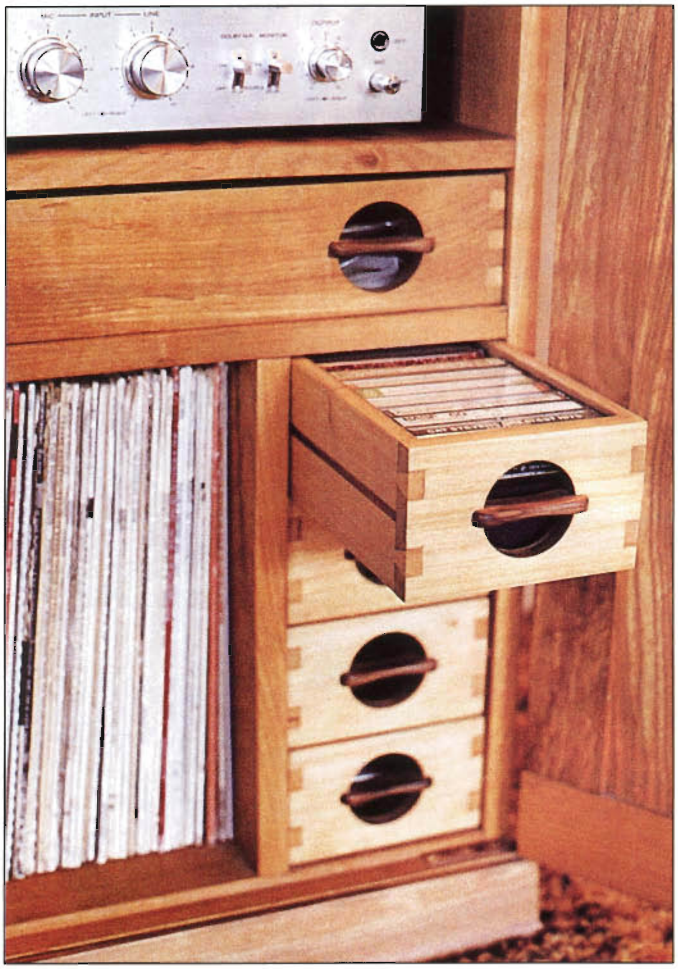
*__Ken Sadler__ is a retired custom furnituremaker in Portland, Oregon.*

The collection shown on this page are all of the applied type. They are simple in design because my work in general is simple in design. The three long ones and the short rectangular one at the right were created on the router table. First I bandsawed and disc–sanded their finished shape; then I hot–glued a pair of dowels to the top to serve as temporary handles so I could rabbet the underside without getting my fingers too close to the cutter.

The round pulls shown above were obviously done on a lathe and the big square one, which has a round base, was also done on a lathe. I mounted the square blank on a screw chuck and turned the base to size.

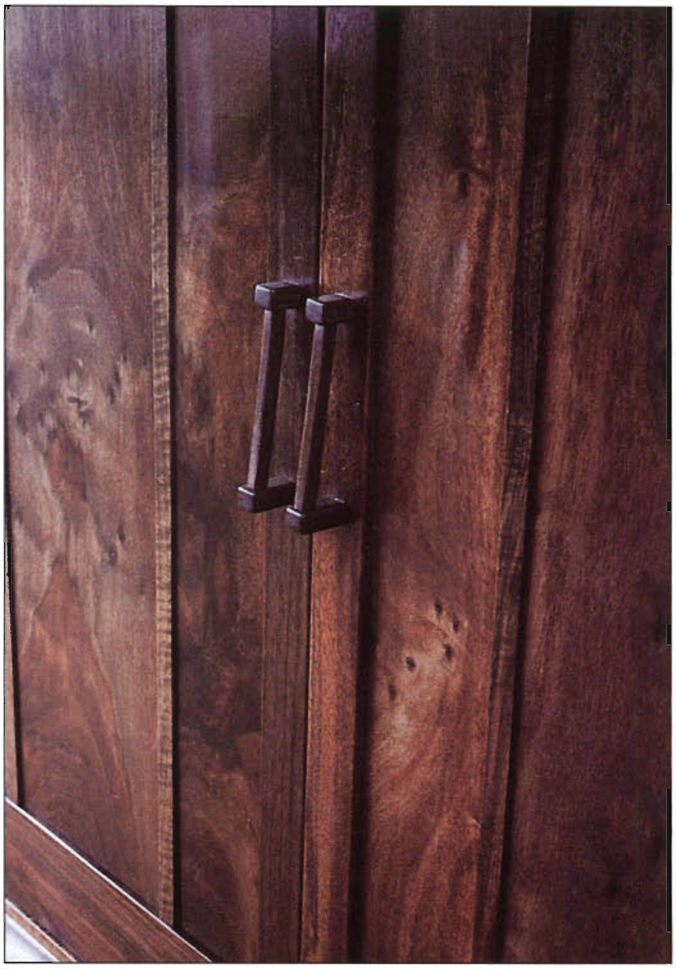
The little square pulls were made by ripping a square stick and then cutting the pieces to length from it. Decide which is to be the bottom end and drill a 1/4" dowel hole about 3/8" deep (I always use dowels and glue to attach applied–type handles). Then taper the sides with a paring chisel. To do this, place the piece on end and hold it firmly with your thumb as you carve, making downward cuts with the paring chisel.

The little flat handle at the bottom above has an interesting application. It is clearly shown in the photo on the next page. I used it on the drawers in a stereo cabinet. The cabinet doors had to be able to close over the handles, so they could not protrude very far, yet they had to provide a firm grip. The answer was to cut a 2" diameter hole in the drawer front with a hole saw; then cut the handle to fit as shown. It protrudes barely 3/16" beyond the front of the drawer but has 5/8" of gripping surface. Notice that the front edge and both faces of the handle are carved slightly concave. This takes the stiffness out of the shape.



photos by the author

*These handles had to be nearly flush to fit behind the cabinet doors when closed.*



*The tilt of these handles required me to carve round tenons at the same angle in opposite directions.*

There are two other applied–type handles shown in the photos here. Both are a bit tricky to make work As you can see, the one above right is made up of three parts: the top and bottom posts and the connecting piece that forms the actual handle. None of these pieces are round, nor are they square with one another, although the posts are parallel. The best way to make this is to lay it out full size on paper. This way you can accurately determine the size of the various pieces and the angles involved. The tricky piece is the connecting section. This is a rectangle with round tenons cut on each end. Each tenon must be cut at the same angle but in opposite directions, so that they will go into holes drilled perpendicular to the face of each post. The only way I found to cut those tenons was with a knife. The posts are fastened to the door face with dowels. Use the largest dowel that you can get into the base of the post and set it into the post about 3/8" to 1/2". It should go into the door about 1/2". This will make the handle strong enough to withstand the sideways forces to which it is apt to be subjected.

The handle shown at the near right is quite different. Although it looks like it was made out of the board that runs the full length of the doors, it was applied separately. It's cut out of a block of wood as one piece, posts and all. Draw the shape on the side of the block and rough saw it on the band saw or scroll saw. From there it's just a matter of using a knife, carver's rasps, files, and sandpaper to bring it to finished condition. Notice that the posts are narrower than the handle proper, and are oval in cross section and flared at the base. The face is concave and the sides of the handle are convex. Because the grain in the posts is parallel to the face, the posts are weak and without being reinforced, could snap off with a sideways twist. The answer to this is to mount it with long screws driven through the back. I used a #8 flat head wood screw long enough to go through the door and into the handle almost its entire thickness. Drill two shank holes in the door and shank holes in the posts for half the length of the post; then drill pilot holes to within 1/8" of the face. Apply glue to the base of the posts when you make the installation, though not too much, or it will squeeze out the edges and make a mess to clean up. The last step in making this handle comes when the glue has dried. Using sandpaper, feather the flared posts into the door face. Be careful that you don't create a depression in the door face while doing this.

Another type of handle you can make is one that is added on, but made to look as if it had been carved from the surface of the piece. These pulls are not difficult to make, but they take some careful planning. The most important consideration is to have the wood in the two parts match as to color and grain pattern.

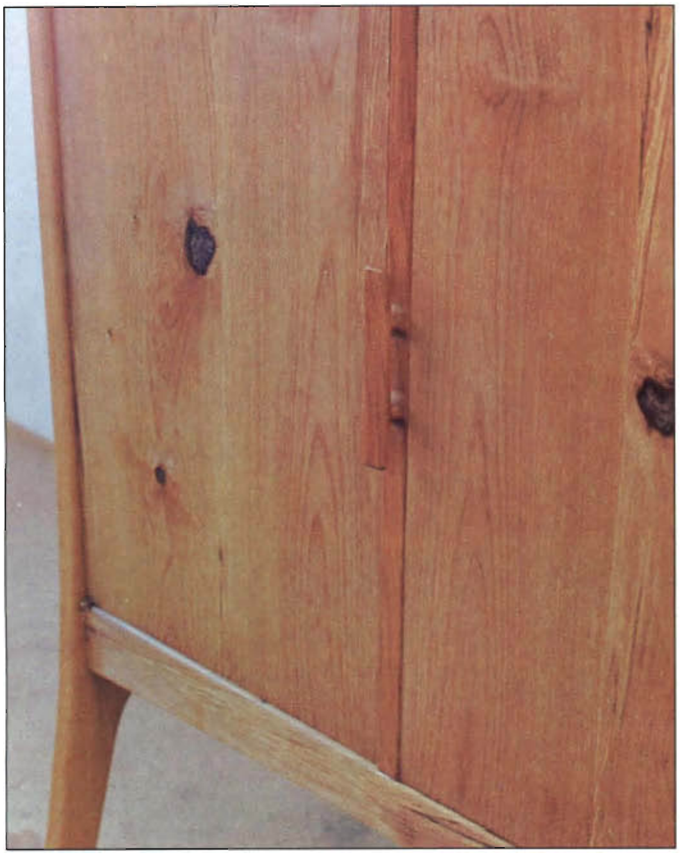
In the photo at the far right above, two drawer fronts of different lengths are cut out of a single board and kept in sequence. I chose the face I wanted as the front, then drew a line across it at the point where I would separate it into the two fronts. Next, I cut a 3/4" wide X 3/8" deep groove the entire length of the front (you can locate this groove wherever you like vertically). I cut a piece slightly longer than the drawer fronts from a piece that matched the color and grain well, and finished its thickness to make a snug fit in the groove. This fit is very important because you don't want the joint to show when you are through. Place the piece in the groove and draw a line on each side at the surface of the drawer fronts and one at the dividing point of the two fronts. Remove the piece and sketch your handle shape on one face. Be sure that each handle is centered in the drawer front to which it belongs. Now, cut out the shape, leaving about 1⁄16" past the line in the areas where the handle will be flush with the drawer front. Glue the piece in the groove. From here on it's just a matter of careful carving, filing, and sanding to get your finished handles. I made the top and bottom surfaces slightly concave (to give a better feel to the handle) and then feathered them into the drawer front. When you have everything finished to your satisfaction, you can then cut the drawer fronts apart and proceed with making the drawers.

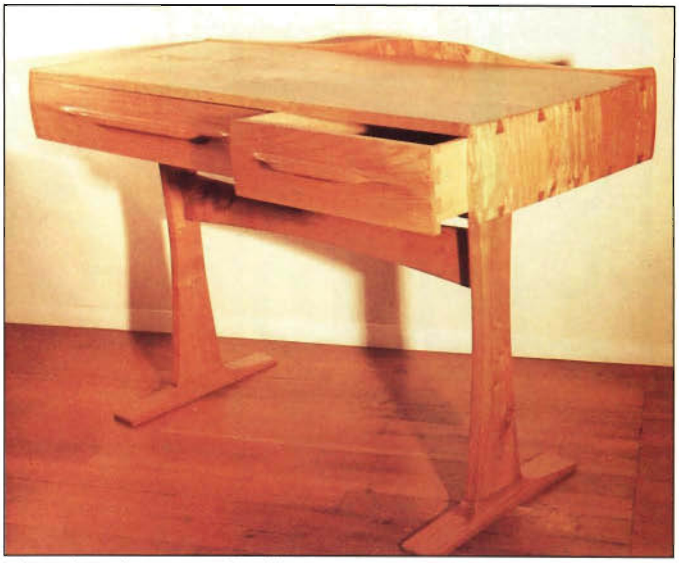
Many other handle designs can be created by this technique; just sit down and do a little visualizing and I'm sure you will come up with some interesting ideas.

The last of the three types of handles are those that are actually carved from the piece itself. The drawers in the breakfront in the photo below right are good examples. For this type there isn't much explanation to give. You work out your idea and then go ahead and carve it into the wood. As before, the three drawers were made from one board and the carvings were completed before the piece was cut apart. A word of caution; be sure your piece is thick enough to let you do what you have in mind.

As I said in the beginning, handles are important; they can make or break your design. Creating your own will exercise your imagination and expand your skills. Plus they're a lot of fun to make. PW

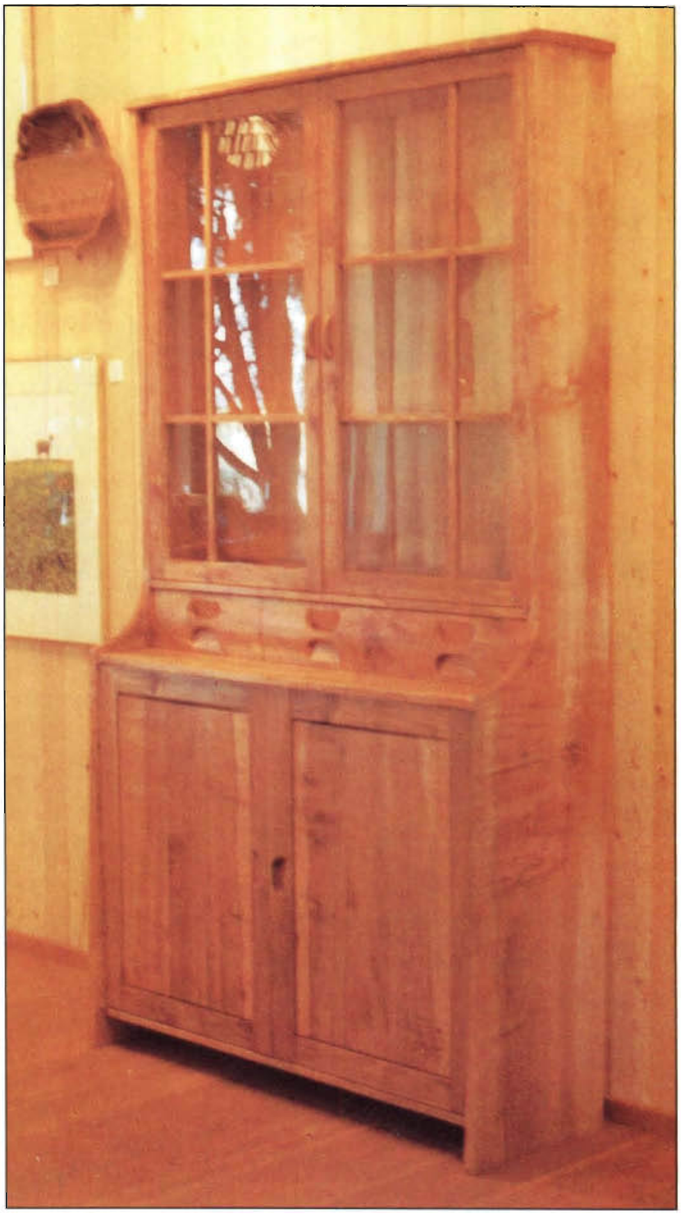
***By sanding carefully, I was able to make the feet of this pull blend into the surface of the door.***





***These handles were glued into a groove in the drawer fronts before they were cut apart.***

***Most of the handles below were carved out of the piece, rather than applied to it.***



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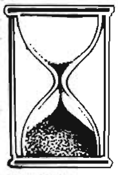

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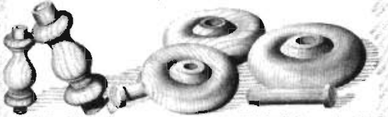

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# Book Reviews

by Hugh Foster

**Popular Science Decks and Sun Spaces** by Alfred Lees and Ernest V. Heyn (Sterling Publishing Company, 387 Park Avenue South, New York, NY 10016) 255 pages, paperback, $16.95

The projects in this book are realistic, affordable and large scale. The introduction proposes that a house with a well-made deck or sun space provides the highest return on investment when it's time to sell. The weekend woodworker or ambitious home remodeler is sure to find something in the three dozen projects; the tips alone are worth the price of admission. The appendix "Metric Makes Planking Easier" is almost convincing enough to make me want to convert.

If there's a deck, gazebo, porch, pool room, or other outside addition in your future, you should spend some time with this book. It's sure to save you a good amount of time, money, and aggravation.

**Garden Furniture: A Practical Handbook for Woodworkers** by George Buchanan (Sterling Publishing Company, 387 Park Avenue South, New York, NY 10016) 128 pages, hard cover, $27.95

By the time this book reached me, I was so intent upon building a couple of teak or mahogany benches for my backyard that I'd already started photographing them in public places. I projected the slides on large sheets of paper and traced the outlines—but they weren't square and not buildable. The instructions given here are more than enough to lead anyone to completed projects.

For starters, there are two tables of contents. One lists the book's sixteen projects—benches, tables, chairs, etc. The other lists relevant techniques. I like this format, but even better is a chart listing necessary tools, level of difficulty, types of joints, and approximate costs and time needed.

The information about woods, glues, and finishes is complete and clear. The discussion of woodworking technique assumes that you know a fair bit about woodworking. The accompanying drawings make each step very clear and the artwork is high quality. There is a color photo of each project in a natural setting.

All in all, I'd have to rank this work as useful and handsomely presented. I was pleased to find a relatively simple garden bench, and a chaise lounge like the ones on cruise ships. While a couple of the other projects won't find a spot on my property, each is attractive. This is the first treatment I've seen of this particular subject, and I doubt that it will be done better any time soon.

**Build-It-Better-Yourself Woodworking Projects: Weekend Projects** by Nick Engler (Rodale Press, 33 East Minor Street, Emmaus, PA 18098) 123 pages, hardcover, $19.95, paperback $14.95

The *Build-It-Better-Yourself* series from Rodale Press is uniformly handsome. These volumes start providing valuable information on the inside covers. The projects are seldom spectacular, but they are always useful and attractive. The highlights of this volume are the recycling bins and the floor–to–ceiling bookshelves, although I can't see the latter as a one weekend project. The garden stand project would be just as handsome in someone's living room as a plant stand. Various other decorative and functional projects make the book worthwhile. What really sets the book apart from other "quick project" books is its wide range of tips. At first, they seem to display an amazing grasp of the obvious, but on second thought you'll wonder why you didn't think of that. For example, you've probably used cut-off blocks on your table saw miter gauge; Engler suggests that they be cut at 45° so that you won't have to clear dust from the corner after every cut. You're sure to find many helpful ideas to make work quicker and safer; the projects are almost a bonus.

**Victorian Fretwork: Over 100 Ready–To–Use Patterns and Decorative Ideas** by John T. Jenson (Storey Communications, Inc., Pownal, VT 05261) 128 pages, paperback, $9.95

The current high interest in scroll sawing has generated a lot of pattern books that could just as well be replaced by children's coloring books. This book is different. Instead of offering a number of cute, unrelated projects, this one offers just what its title advertises. Chapters treat six aspects of the Victorian decoration sometimes called gingerbread: columns, porch fencing, gables, screen doors, shutters, and picket fences. Some of the screen door patterns could be useful as decorative shelf brackets, even if you have no intention of decorating Victorian exteriors.

The instructions advise that these patterns can be sawn by hand with muscle power and a fret saw, and many could be cut as well with an electric sabre saw.

**Purpose–Made Joinery (2nd edition)** by E. V. Foad (Linden Publishing Co., 3845 N. Blackstone, Fresno, CA 93726) 317 pages, paperback, $19.95

This is the second edition of a book that was originally published in the U.S. by Van Nostrand Reinhold in 1982. The author is a noted British woodworking teacher, and he begins with design and proceeds through communication, technical geometry, and projects that illustrate various aspects of advanced topics. The project categories include windows, doors and frames, wall paneling, work surfaces and counters, storage and display fitments and seating, and stairs. The technical drafting that illustrates most of the book is impressive, nearly awesome. Neither a light read nor a book of projects for amateurs to build, *Purpose–Made Joinery* will elevate the quality of your craft and makes an excellent reference book.

**Table Saw Basics** by Roger Cliffe and **Scroll Saw Basics** by Patrick Spielman (Sterling Publishing Company, Inc., 387 Park Avenue South, New York, NY 10016-8810) 128 pages, paperback, $9.95

These are the third and fourth volumes I've seen in Sterling's new *Basics* series. They present an abbreviated view of the contents of their longer and more complex *Handbook* series. This concept is not just a marketing ploy. Each offers enough tips and useful information to be worth keeping. **Table Saw Basics** has clear and simple directions for squaring up table saws. Cliffe provides new advice about

***Hugh Foster** is a woodworker in Manitowoc, WI and the author of* The Biscuit Joiner Handbook *(Sterling Publishing Co.)*

models, styles and blades, along with instructions on accessories, jigs and the full range of cuts, plus safety guidelines and dozens of handy tips and shortcuts. The dozen projects will lead to safer and more accurate sawing. Recommending this book is a real pleasure!

Recommending **Scroll Saw Basics** is just as easy. The text is an improvement on the now–dated *Scroll Saw Handbook*, which I admired quite a bit when it was first published. Since this latter title was published, low-priced Asian saws have all but taken over the market. It's hard to imagine how some of the old–line saws can cost a thousand dollars and not be better than the least expensive imports. Spielman appears to make these imports even more attractive by explaining in well-illustrated detail how to upgrade them so they'll behave like their more expensive European cousins. You may find that this section alone makes the book worth more than the cover price.

**The Backyard Builder: Projects for Outdoor Living** edited by William Hylton (Rodale Press, 33 East Minor St., Emmaus, PA 18098) 506 pages, hardcover, $26.95

This handsome volume shows perhaps almost more than you'll ever want to know about building for the outdoors. Beginning with designing outdoor projects, Hylton moves in logical order from providing power, light, and water, through altering the landscape, to projects covering (a) fences, gates and trellises, (b) framed structures (decks, gazebos and the like), (c) pools, hot tubs and spas, and (d) outdoor furniture.

I suspect the hardest thing about most of the projects here will be deciding which of them to build. They're all appealing. The book will direct your construction of projects large and small—any one of which is sufficient justification for adding this volume to your library.

**Turning Projects** by Richard Raffan (The Taunton Press, 63 South Main Street, Box 5506, Newtown, CT 06470-5506) 169 pages, paperback, $19.95

This may be Richard Raffan's best book yet about turning. His earlier volumes were about turning technique and bowl design, and may have been more abstract than some woodworkers like. This volume will appeal to those people. While some techniques are discussed, it's always in a way relevant to the project at hand. The projects are beauties, and there are plenty. In "Centerwork" Raffan features rollers, mallets and baby rattles with loose rings; in "Cutting End Grain" he discusses beads, spheres and spinning tops; in "Hollowing End Grain" he treats little bowls, scoops, vases and pepper mills; and in "Facework" he makes trivets, trays, bottle coasters, hand mirrors, ladles and other hollow vessels. This is a most handsome book, one that many of us will want to take into the shop for an extended stay. The photos and drawings are real assets, but Raffan's lucid prose would work even without them. If the best way to learn is by doing, then this is as good a turning workshop as you're likely to find.

**Band Saw Pattern Book** by Mark & Gene Duginske (Sterling Publishing Company, Inc., 387 Park Avenue South, New York, NY 10016-8810) 192 pages, paperback, $12.95

Mark Duginske probably knows more about band saws than any other living person, and here's more proof. Generally, I'm not enthused about pattern books. Most of us would do better to get our scrolling patterns from coloring books or the comics. But this is a book that will make you a better band sawyer and keep you busy with meaningful projects. While there are some nature cutouts that have fairly little utility, there are geometric and architectural designs, numbers and letters, and small useful projects such as benches, tables, chairs, toys and shelves (including the most complete collection of shelf bracket designs that you'll ever hope to see). There are even large cabinets and hutches. I'm adding this valuable reference text to my shop library.

**The Furniture of Gustav Stickley: History, Techniques, Projects** by Joseph A. Bavaro & Thomas L. Mossman (Prentice–Hall Press, 15 Columbus Circle, New York, NY 10023) 175 pages, hard cover, $35

My grandma's house was furnished with Craftsman–style furniture, so the front cover of this handsome volume brought back memories. I remember thinking it was comfortable. Grandma's kids must have seen it as old stuff, for when Grandma died, the furniture disappeared. Apparently that's happened in lots of families, for this furniture which Stickley intended as a comfort for the working class has become so rare that it exists now almost solely in museum collections.

This volume makes available some of these now classic designs in patterns that patient woodworkers can follow. Detailed drawings and step–by–step instructions will enable readers to reproduce a mirror, screen, combination bookcase and table, rocker, recliner, settle, dining table, bookcase, and clock case using the same techniques that Stickley himself used. The book even has instructions for liming the oak you might use in making authentic Craftsman furniture.

**The Cooper and His Trade** by Kenneth Kilby (Linden Publishing Co., 3845 N. Blackstone, Fresno, CA 93726) 192 pages, paperback, $16.96

First published in England two decades ago, this is a fascinating history of a craft that died incredibly quickly. The opening chapters detail the author's early years as an apprentice cooper. The middle chapters describe the various kinds of cooperage, and the closing chapters present a brief history of coopering in England through the ages.

This book is probably more history than woodworking, but it is fascinating. Here's a branch of woodworking that not many are likely to pursue; a barrel is *not a thing* that can be as casually made as a chest. If all the parts don't fit perfectly, the thing will leak.

This volume was encouraged by R.A. Salaman, author of the fabulous *Dictionary of Tools*, recently reissued by The Taunton Press. Indeed, this volume joins that famous work as a necessary tool for those of us who hope to understand woodworking through the ages. Beautifully written and historically accurate, this book describes the end of a trade. PW

# Videoscene

by Alan Marks

**Ultralight Boatbuilding** with Thomas J. Hill, ©1991 Brookfield Craft Center, Box 122, Brookfield, CT 06804, $49.95, 135 minutes.

I found this video fascinating. I have often pondered the process that boatbuilders use to bend and shape planks to produce a lapstrake design. The lapstrake boat, a century–old construction method, is built of beautifully curved, lapping planks. Some of the earliest known examples were funeral boats in the tombs of ancient Egypt. The same techniques are still being used four thousand years later.

We now have two new materials, plywood and epoxy, and they have drastically altered some of the parameters. In combination, they eliminate many of the stiffening members and much of the mass previously needed.

The video project is an eleven and a half foot canoe. The plywood planking is 5/32" thick, yet the canoe is strong and rigid. On completion, *Charlotte* weighed only 27 pounds. The canoe is easy to build; though large stationary power tools are helpful, they're not required, but plan on having plenty of clamps. Materials for the *Charlotte*, including paint and fasteners, shouldn't cost more than $300. The plans are available from Thomas Hill, RR#1, Box 2310, Huntington, VT 05462, (802-434-2532) for $39.00. They include full–size patterns for all shaped parts, a list of wood pieces and sizes, jig dimensions and some crucial notes and comments.

A few years back, Hill wrote a book by the same name (*Ultralight Boatbuilding*, International Marine Publishing Company, Blue Ridge Summit, PA 17294, $17.95, paperback). You could build the *Charlotte* with the book alone, but I would strongly recommend having both book and video for reference. Hill offers a package deal with plans, book, and video for $98.00.

The tape can be divided into two major parts: building the jig and building the boat over it. Tom Hill is engaging, a good craftsman, and usually clear in his explanations. The terminology was fairly easy to grasp with repeated exposure and the book was immense helpful; it contains a glossary of terms. All of the procedures are demonstrated, but two things gave me trouble. It helps to have a working knowledge of boat–building terminology and construction. I didn't fully understand the visual presentation in some of the more detailed areas. A few of the procedures in the tape only became clear after looking them up in the book. It was difficult to grasp the sequence used in scribing, planing, gluing, bevelling, flush–cutting and inletting each successive pair of planks. Luckily, the book is fairly clear—a compelling reason to have it on hand for reference.

The video was technically very well done. The camera work, lighting and editing are excellent. The cassette jacket contains a list of suppliers and a Table of Contents, which is helpful in relocating particular topics.

The canoe–building process outlined here provides a combination of technical and aesthetic gratification. Furthermore, when finished, the end product will give years of pleasure. I strongly recommend both the video and the project.

**Turning Projects** with Richard Raffan, ©1991 The Taunton Press, Box 5506, Newtown, CT 06470-5506, (800-888-8286), $39.95, 90 minutes.

This is the second Richard Raffan tape I've reviewed. The first, called *Turning Wood*, dealt with the basics. The projects in this new video were chosen to provide practice and improve turning skill; they could easily be considered a collection of turning exercises. A highly skilled turner, Raffan works quickly and is exceedingly well organized.

A companion book with the same title is available for $19.95 (see the reviev on the previous page. It's well worth owning since it contains amplified comments on tool manipulation for each project. In addition to the projects in the video, the book presents twelve others.

The tape begins with examples of three different types of projects: centerwork, end grain and facework—represented by spindle, sphere, and trivet. Centerwork refers to work done between centers, one in the headstock, the other in the tailpiece. Grain in centerwork projects runs parallel to the axis of the lathe bed. These projects are a stirring tool, called a *spurtle*, a spatula, carver's mallet, meat mallet, and spindle. This slender piece is constantly in danger of snapping in two. Raffan frequently cradles the spinning workpiece with his left hand to prevent vibration and bending while cutting with his right.

Working end grain entails chucking in the headstock and making shearing cuts perpendicular to the lathe axis. Tool usage and technique for this specialized type of work are not covered in the video, but are in the book.

Raffan makes a top out of lignum vitae, then spins it for us to show that it really works. He hollows out the end grain and makes a small bowl. After severing it from the blank with a parting tool, he turns an appropriately sized taper on the blank and presses the bowl in place over it so the bottom of the bowl can be turned flat. For his final endgrain feat he turns an impressively large sphere.

In the facework projects section, he makes a bottle coaster and a bowl with straight sides perpendicular to a flat bottom. He demonstrates the use of Super Glue™ with an accelerator to fill a split with sawdust. He also uses it to glue the lid on a hollow vessel made from cocobolo. Cocobolo dust is generally considered toxic, so I felt uncomfortable watching him turn it without a dust mask.

He rarely mentions the lathe speed at which he turned these projects and often does not identify the wood type. The book has more information, but the tape gives an inspiring demonstration. It had for me a pleasant blend of on–screen narration and voice–over. A native of Australia, Raffan speaks a cultivated English and his refined evaluation of his lathework sounds like a sportscaster at an afternoon's match at Wimbledon.

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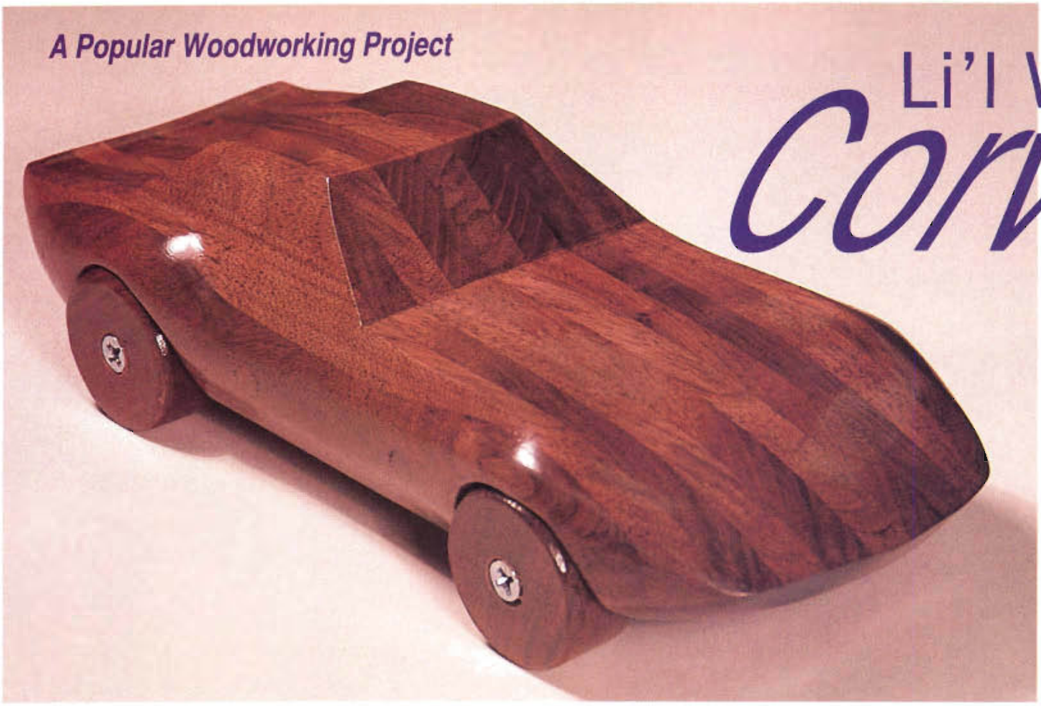
***Alan Marks** designs and builds furniture and cabinets in Carmel Valley, California.*

A Popular Woodworking Project



# Li'l Wood Corvette

## A First Carving Project

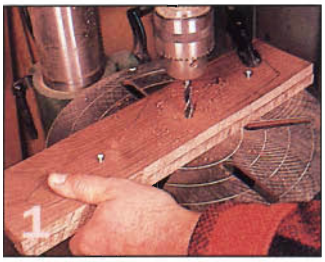
### by Jeff Greef

Watch the eyes light up when you roll this sleek little aerodynamic beauty across the floor. It's fun to make, too. After designing the project, I was a bit concerned because I hadn't carved before and had no carving tools. I soon discovered that all the carving can be done with an ordinary bench chisel and turning gouge, and the project can be completed in a couple of weekends. Shaping the car body is a real pleasure—you become the automotive designer and determine its final form.

Begin the project with eleven pieces, each $^1/_2$" X 4" X 14". I used walnut for its color but you might want to choose a softer, easier–to–carve wood like basswood. A softwood like pine might not hold the wheel screws when the car goes flying down the stairs. Use the patterns in the PullOut™ Plans to trace the outline of each layer—there are eleven layers and six templates. Use template #1 for the center layer; and the others to lay out symmetrical pairs on each side of the central piece.

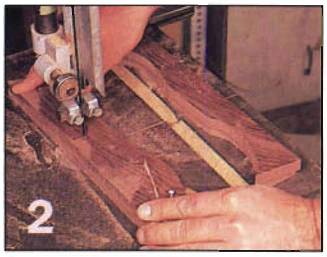
Stack the pieces in order, striving for consistent color throughout. Remove the two outer pieces and tape the remaining layers securely. On the drill press, drill a $^5/_{16}$" hole all the way through the stack, which should be $4^1/_2$" thick.

Remove the two outer pieces from the stack and tape them in proper sequence to the two outer pieces you removed earlier. Use the holes as guides to drill about $^1/_4$" into the undrilled pieces (1).



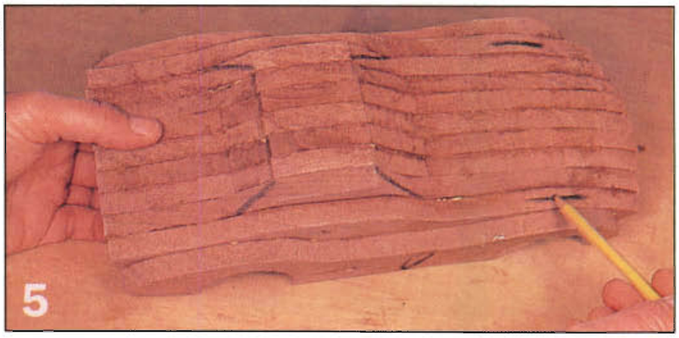
Now match up the pairs that are duplicates and trace the patterns onto one piece of each pair. Join them together with dowels in the holes you just drilled, and cut them to shape on the bandsaw (2). When cutting the outer pair, use small nails outside the pattern area to hold the pieces together.

Since the wood pieces must fit onto 5" of dowel, it's best to use a dowel slightly smaller in diameter than the hole—in this case, $^1/_4$" dowel. Once you've applied glue to each layer (3) and put them together on the dowels, flush up the bottoms of all pieces except the two outside ones. Once flat, check the alignment of their tops (4). If one is noticeably lower than the others, lift it up a bit. If this pulls the bottom out of alignment, don't worry because it will be easy to sand flat and the top will be carved. Be sure that the bottoms stay parallel, even if they're not flush, or the car will appear slightly warped.



Once the carving blank is out of clamps, mark the high spots such as the window edges and fender tops with a pencil (5).

author



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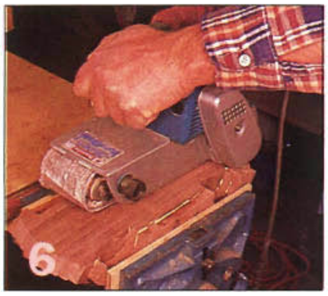
***Jeff Greef** works wood and writes about it in Soquel, California.*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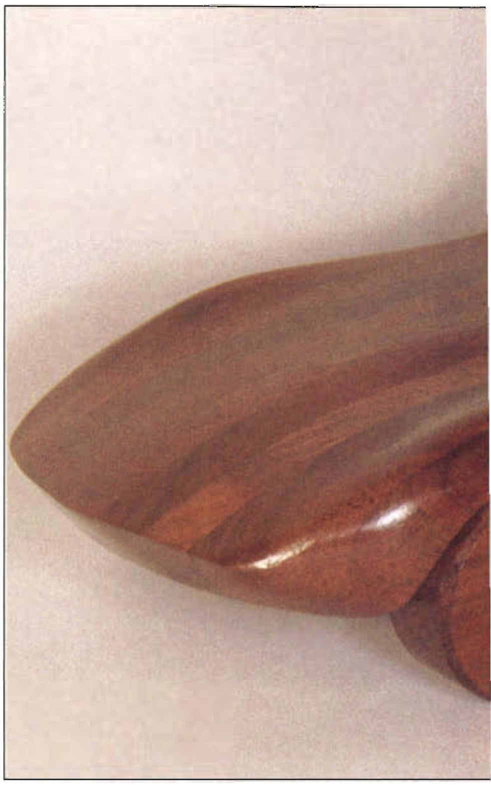

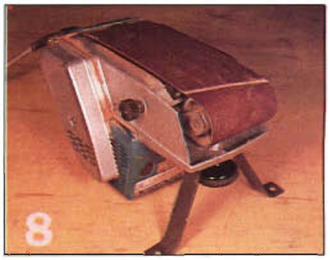
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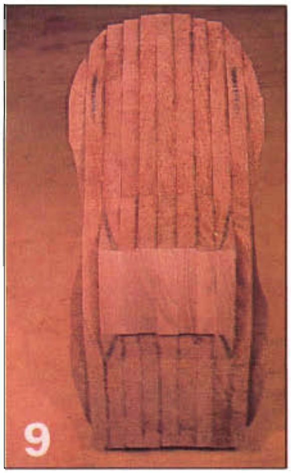
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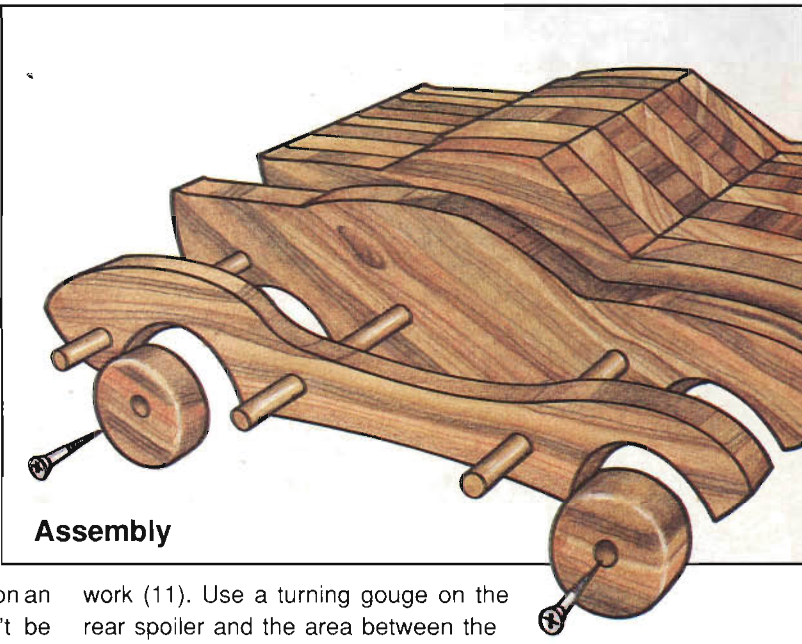
Begin shaping the body with a belt sander. The bottom and the roof top can be sanded flat (6), and the outer front and rear fenders can be shaped in the same way (7). A stationary sander is helpful, but if you have a hand–held belt sander you can securely position it upright with a fixture and use it like a stationary sander (8). It's easier to hold the wood against the sander rather than vice versa when shaping curved surfaces.

Use the band saw to cut the internal curve between the fenders on each side of the car. These cuts go through more than half the thickness of the outer layer, and begin and end where the wheel wells start (9).

By this time you have done as much shaping with your power tools as possible, and it's time to carve. Start taking small cuts with a sharp bench chisel (10). Study the work as you go, and don't take too much off at any one point. It's not a good procedure to finish carving in one area before going on to the next. I found it best to rough shape the whole blank, then come back and refine sections. Often you can't be certain what shape a certain area should take until you've brought adjacent areas a bit closer to their final shape. Take your time. I tried for the general form and not for an exact duplicate of the Corvette. You can shape it however you like: a little sleeker or a little more rounded.


**Assembly**

Bob Chapla and Ginny Pruitt

Carving with a bench chisel works well as long as you're on an outside curve. There are many inside curves that can't be reached with the flat of the chisel. A couple of approaches can be used here. To get into corners and the door area between the wheel wells, flip the chisel over so the beveled edge is against the work (11). Use a turning gouge on the rear spoiler and the area between the peaks of the front fenders. It will leave a bumpy surface, but you can clean that up with some rough sanding (12). Of course, "real" carving tools are designed to do this work more efficiently.

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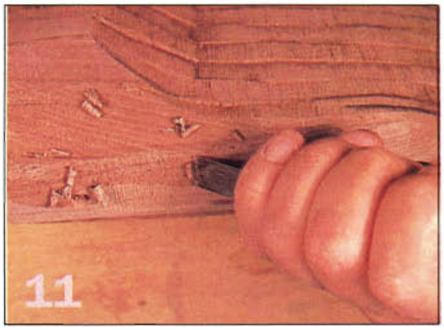
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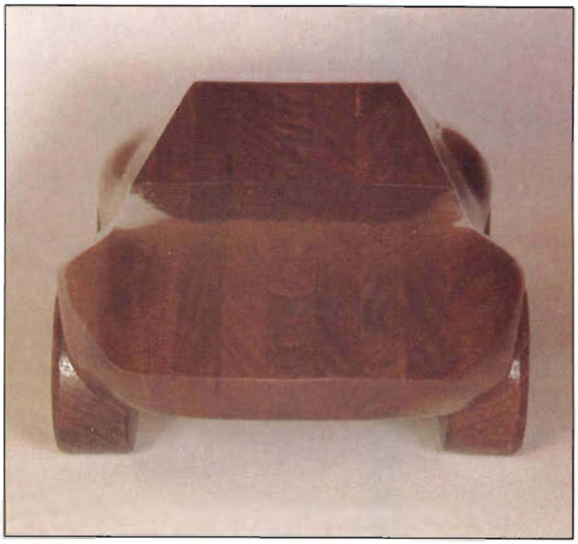

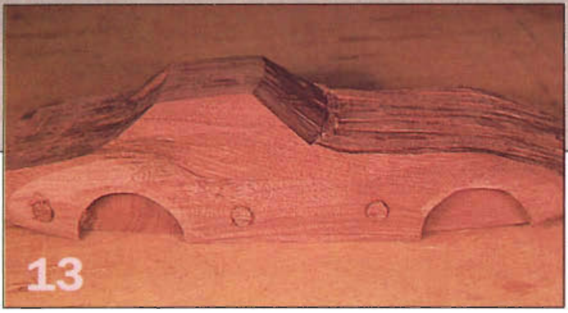
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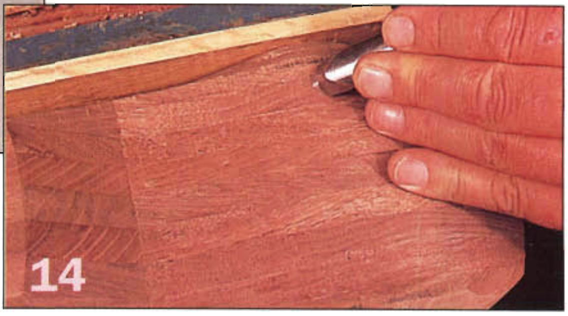
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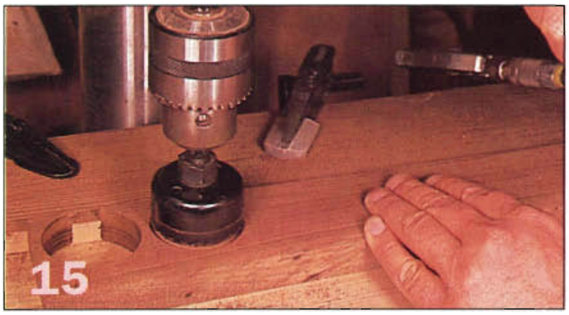
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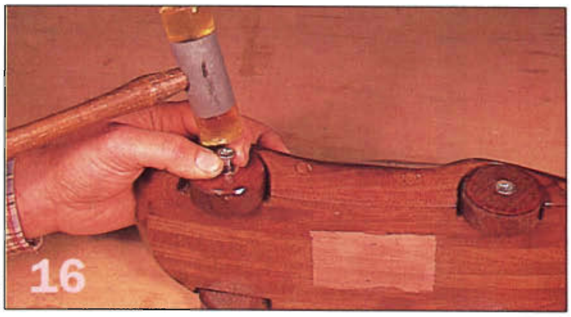
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Pay attention to the direction of the grain on the individual layers. Always carve with the grain or you may lift up big chunks that go below the level you intended. If you remove too much in one area, carefully bring down the surrounding area to match. Plug up any dowel holes, if needed, before you finish carving. Drill into the dowel hole ¼" or so and glue in a plug that matches your wood type and grain as closely as possible. Carve them down at the same time as the surrounding area (13).

When the blank begins to take its final shape, use your chisel and gouge as scrapers to smooth the surface (14). Turn the tool over, place the cutting edge directly on the wood and pull it toward you. This especially helps in areas left bumpy by the gouge.

Once you've carved as far as you can with the chisel and gouge, begin sanding with 60–grit paper. Work your way up to finer grits to get the finish you want.

Cut out the wheels with a 2" hole saw—it simultaneously cuts a round wheel and bores a center hole (15). Use 1" thick stock or glue up two pieces of ½" scrap. You'll need a piece 2½" X 9" to cut out all four wheels. Round over their edges and sand them down. I didn't add a lot of fine details because they won't withstand some of the tight turns and quick stops the kids will put the car through. But if you want to make a show model, find some photos and get as detailed as you please.

Finish the car and the wheels separately. To get a good shine, sand the finish between coats with 400-grit wet/dry paper, but not the final coat.

When dry, locate the wheel screw holes in the wells with the wheels in position, and mark through their holes with a screw (16). Leave enough clearance so the wheels turn freely. Use 1½" screws with shanks the same diameter as the wheel holes (brass Phillips–head look nice). Drill for the screws in the chassis and countersink the wheels. Attach them, make sure they spin, and take her out for a test run. Better give the kids some driving lessons before you hand over the keys! PW

# PATCHWOOD

Elizabeth Vanderliet

### by Garmon Coats

"Israel loved Joseph more than all his brothers...he made him a tunic of many colors."

Every wood's texture and color endows it with its own special character. For example, aromatic cedar suggests both intimacy and timelessness; oak appears solid, indestructible and noble. Walnut can seem the introvert's wood, warm and silent, while pine is simplicity personified. Now imagine one piece of wood which presents all these traits—a wood of "many colors."

You can make your projects from such a piece—jewelry boxes, cabinet inlays, salad bowls—by first making sheets of "patchwood" from an assortment of scraps. Every woodworker produces scrap wood and in most cases is reluctant to throw it out, thinking that later he'll find a use for it. Here's one use. You can make sheets of patchwood in whatever size and thickness your project calls for. However, I recommend a minimum thickness of ½". You may want ¼" sheets, but ½" construction allows for sanding or planing. I'll describe the size sheets I like to make, but you can always splice the sheets together, and you won't be able to tell where the splices are.

First make the jig. For 16" X 24" sheets, cut a piece of ¾" plywood 20" X 28" and four ¾" X 2" slats, three of them 15" long, one 20", one 23", and one 26". You'll use these for clamping edges. Glue and nail (or screw) the 20" slat flush with the 20" edge of the plywood. Likewise, attach the 26" slat on the 28" edge, butting it up to the first slat. Use a carpenter's square for a true 90° corner. Leave the other two edges of the plywood open.

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***Garmon Coats** works wood in Huntsville, Texas.*

Now you're ready to start laying out your patchwood. Set the fence on your table saw ¾" from the blade and begin cutting the scraps into strips. Be sure to use a push stick when cutting these small pieces. Cut as many strips as you'll need before moving the setting on the fence. You may want to cut all of your scrap at once, or enough for a single project. Strips cut after the fence is moved won't be exactly the same width and will cause gaps after you've glued and clamped them together.

When deciding what size sheets you want to make, keep in mind that if you get too large of a sheet going, your glue may start setting before you have all the strips glued.

After all your strips are cut, you're ready to start laying them out on the jig. First lay wax paper on the jig to prevent the patchwood sheet from sticking to it.

Stagger the strips according to color and length, and lay them out in rows. When laying the next row, try to avoid matching end seams with the previous row. Stagger them as in bricklaying. You'll need a saw handy, either a miter or a table saw with a cut–off slide (sliding table). Be sure all of your strips have square ends. Vary their lengths and try to avoid laying the same colors next to each other, unless you're attempting a pattern. Use as many colors of wood as you can come up with. You may even find a beautiful pine knot and cut it in a strip, or a piece of burly walnut, or bird's–eye maple. Use them all.

Leave 2" of space on the remaining two edges of your jig after laying out your strips. You'll need to square off the length end of the strips. Do this by shoving the pieces as tightly as possible against the clamping edges you've glued to the jig. Draw a line as close to the ends as you can get using a square. Then cut off each strip on the line. With this done, you're ready to glue. Slide the strips away from the clamping slats without lifting or mixing them up. Glue only the ends between the pieces on the first row, then shove the strips back up against the slat. On the second row of strips, glue one end and the one side of each piece which will be up against the previous row. Do the remaining rows in the same way.

When you've glued all the pieces, place the other two clamping slats on the jig. Use the 23" and one of the 15" pieces. Using bar clamps, three lengthwise and two on the edges, squeeze the strips together. Tighten the clamps uniformly.

The patchwood sheet may have a tendency to bow as you tighten the clamps. To prevent this, lay your remaining two 15" slats across the sheet with wax paper in between and clamp them down to the jig with C-clamps.

After the glue has dried, remove the clamps and lift the sheet of patchwood from the jig. To smooth it out, use a planer or belt sander with a 60– or 80–grit belt, then 120–grit.

If you do end up with gaps, cracks, or chips, Famowood wood putty comes in all flavors for about two dollars per half pint. Cedar, Oak, Walnut and Natural are all you'll need. I recommend Famowood brand because of its ability to match the woods, plus it dries fast and hard and won't gum up your sand paper. It's available by mail from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374 (telephone 612-428-2199).

Cut your patchwood into anything you want to make. Not only will your wood of many colors make beautiful projects, but it is practically cost free and solves the problem of what to do with the scrap from other projects. PW

## Scrapwood Challenge #2

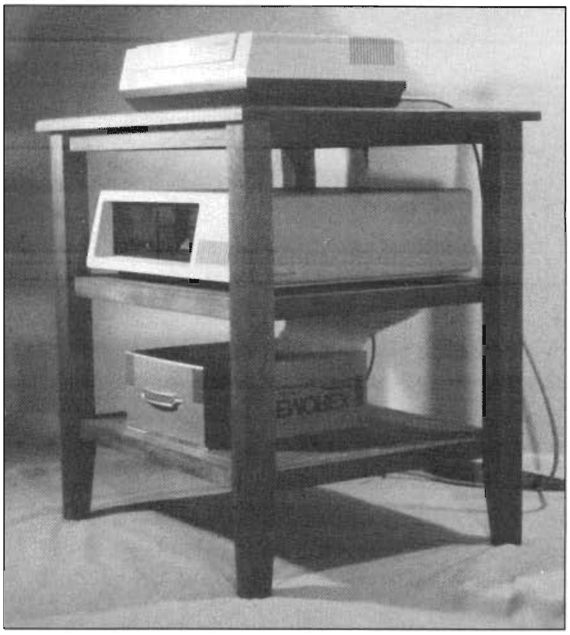
So, you've cut all the plywood panels for that large cabinet job, and you're left with several 3" long, 48" wide pieces from the ends of the sheet goods. As you look around, you can see several more plywood scraps from previous projects, all with the grain running in the short direction.

Use them. Design a project that will incorporate as many short, wide plywood pieces as you can. Let's say they range from 3" to 7" in the long grain direction and 14" to 48" in width. Use any hardware or additional materials you like, but see if you can refrain from cutting the plywood scrap into narrower pieces. Use them short and wide.

**The originator of the best design wins a power tool valued at over $200.** Honorable mentions will receive *PW* back issue binders. An acceptable entry *must* include a dimensioned drawing of your design (rough sketches are fine). Your chances improve if you also include written instructions and a photo of the finished project.

Send your entries to: Scrapwood Challenge, 1320 Galaxy Way, Concord, CA 94520. Entries become the property of *Popular Woodworking*, and the decision of its editors is final. **Entries must be received by January 24, 1992**; notification of winners will be by publication in the May 1992 issue.

# Computer Printer Stand



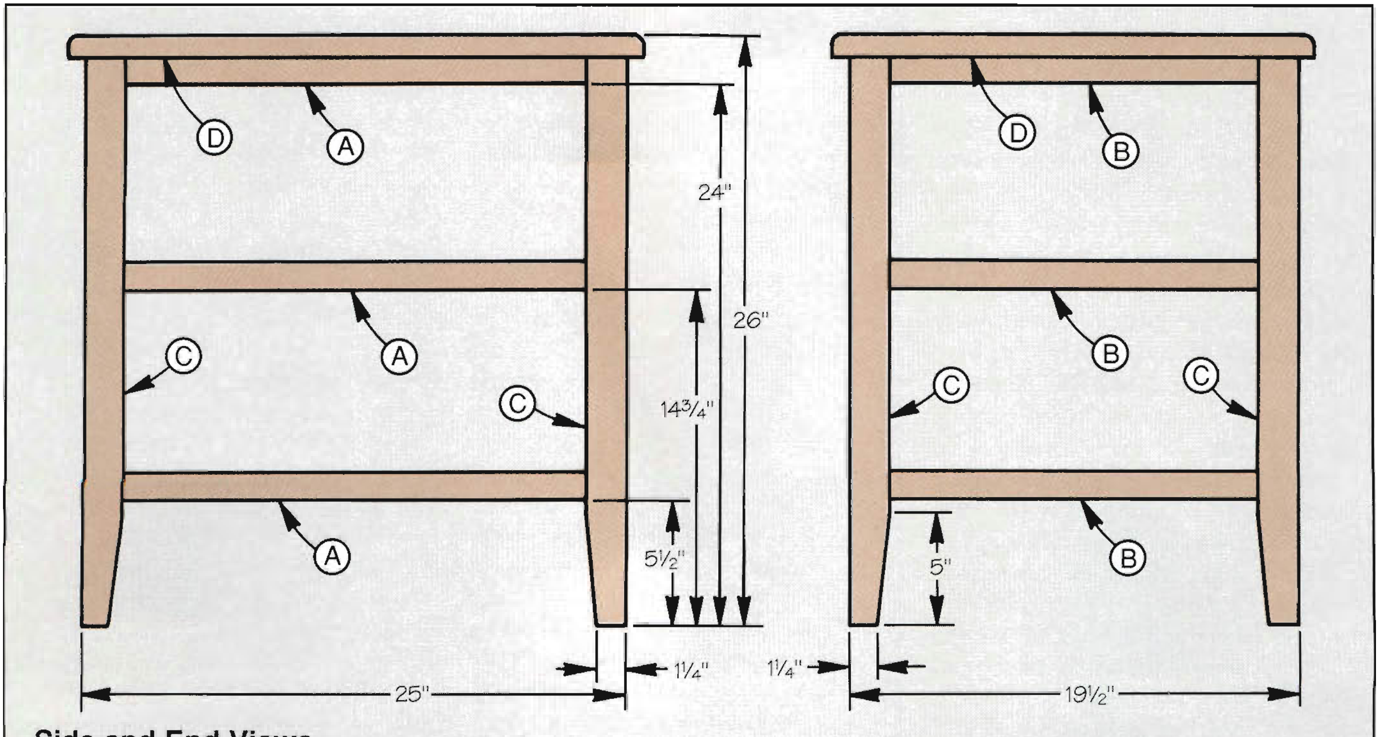
### by Jacob Schulzinger

The most popular pieces of new furniture on today's market are those designed especially for computers. This printer and CPU stand is relatively easy to build and fits into any decor. The width and depth of the shelves must accommodate the CPU you're using (in my case, an IBM PC-XT) and a half-size box of paper. The open stand makes it easier and less expensive to build, allows for easy access, and provides ventilation. The printer—which requires constant monitoring—goes on top, the paper tray—which is seldom serviced—on the bottom, and the CPU in the center where it's convenient to reach. I used mahogany as it's easy to work and finishes to a beautiful rich color.

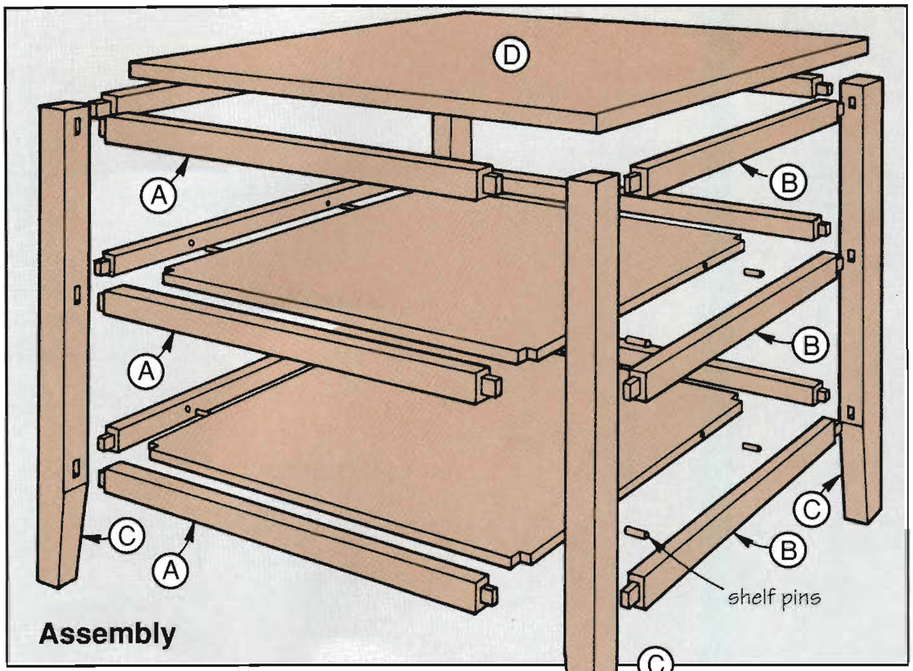
***Jacob Schulzinger** is an industrial engineer who lives in Houston, Texas. Woodworking is his part-time business and hobby.*

Begin by cutting the twelve rails (A and B) from ¾" stock ripped to 1¼" wide, which allows for four pieces to be ripped from a single 6" wide board. Cut all the rails to their finished lengths. As shown in the Rail and Tenon Detail, all have the same size tenons so they can be cut very quickly. First cut a sample tenon on a piece of scrap material milled to exactly the same thickness and width as the rails. Carefully cut the test tenon on the table saw with the piece standing on end, and held against both a larger block behind it and a tall auxiliary fence (or see *Popular Woodworking* #62 for instructions on making a tenoning jig). This operation should be approached with care because the blade is unguarded and the rails must stand straight up. Measure the sample tenon thickness and proceed with the cutting of the real parts only when you're satisfied with the results. I always make my tenons about 1/32" thicker than their finished size because I can always dress them down a bit but can't "narrow up" an overly wide mortise. After cutting the cheeks of the tenons, set the saw and make the shoulder cuts. Finally, square the corners between the tenons and their cheeks with a bench chisel if necessary.

Set the rails aside and start work on the four legs (C). Cut them 1" longer than their



**Side and End Views**

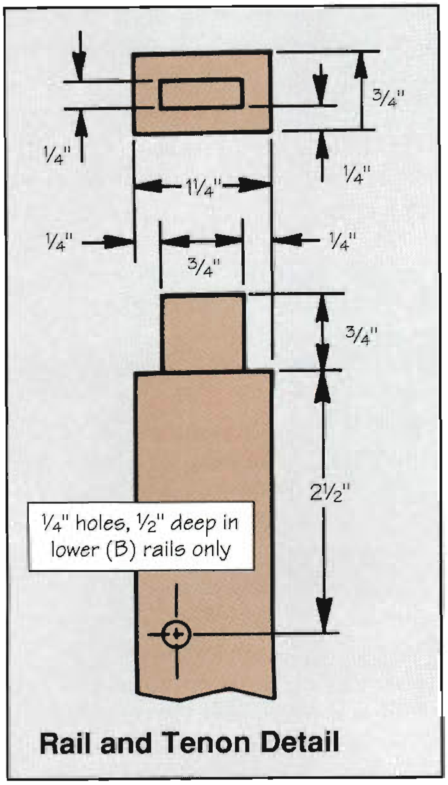


**Assembly**

finished dimensions, with the extra inch left at the top to prevent splitting when you cut the mortises and fit the tenons in them. Mark each leg to show its relative position in the assembly and to identify the surfaces on which you'll chop the mortises and cut the tapers. When laying out the mortises, make sure to take all of the measurements from the same edges on each piece. The easiest way to make them is to drill them out with a Forstner bit and then clean up the ends and sides with a chisel.

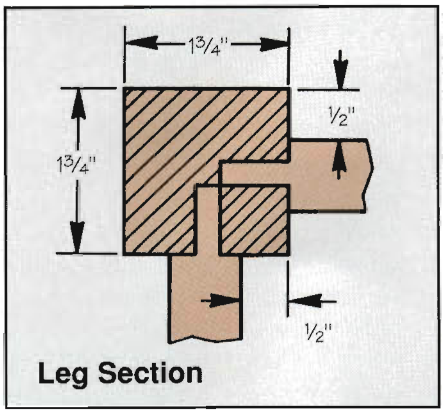
**Printer Stand Cutting List**

| Qty | Part | Finished Size T | Finished Size W | Finished Size L | Piece |
|---|---|---|---|---|---|
| 6 | A | ¾" | 1¼" | 21½" | side rails |
| 6 | B | ¾" | 1¼" | 17½" | end rails |
| 4 | C | 1¾" | 1¾" | 25¼" | legs |
| 1 | D | ¾" | 21" | 25" | top |
| 1 | E | ¾" | 16⅞" | 20 13⁄16" | shelves |



¼" holes, ½" deep in lower (B) rails only

**Rail and Tenon Detail**



**Leg Section**

illustrations by Bob Chapla

Now fit the rails to the mortises and mark each tenon to show in which mortise it belongs. I make my markings on the tenons where they can't be sanded off. After all of the rails have been fitted, trim the legs to their final lengths. Set up the table saw for a taper cut and taper the legs as shown in the Side and End Views. Again, use scrap material to test the setup for accuracy. Make sure that you cut only the inside surfaces of the legs (those with the mortises) and plan the cuts so that a straight, untapered surface will be resting on the saw table during each cut. Sand or scrape the legs and rails to get the final smoothness you want, and break the long edges with a bench plane.

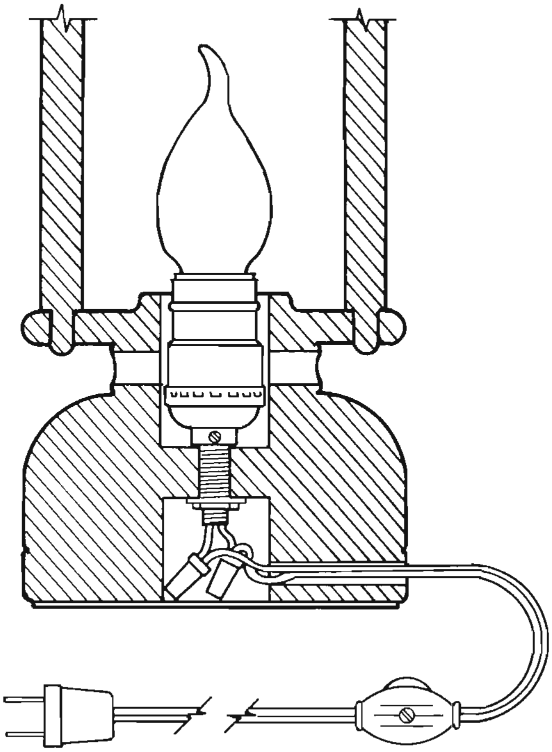
The easiest assembly sequence is to glue up two sets of legs, each consisting of two legs with three rails. After the glue has fully dried, glue the leg assemblies together with the remainder of the rails. This process lets you make minor squaring adjustments easily and simplifies the clamping process.

Make the top (D) by gluing up a panel about I" larger in width and length than the finished size; cut to size after surfacing. Dress up the edges by routing them with a ⅜" radius roundover bit. Attach the top to the base assembly with four Z–shaped tabletop fasteners screwed to the bottom of the top and set into slots routed in the end rails. The slots allow the top to expand and contract freely with changes in the moisture content of the wood.

I cut the shelves (E) from a piece of ¾" medium–density fiberboard veneered with mahogany matching in color the frame and top stock. Make sure the grain runs in the same direction as the top. Determine the finished size of the shelves from the configuration of the shelf pins you use to support them. I used pins with a ¼" diameter plug that require about 3⁄32" of space for the shelf. I cut ½" X ½" notches in each of the four shelf corners with a fine–toothed saw to nest around the legs. To mount the shelf pins accurately, make a simple template to locate the holes in the end rails and drill them with a portable hand drill.

I prefer an easily applied and easily repaired finish—two coats of tung oil, rubbed and followed by a coat of quality paste wax. PW

# Old Oaken Lantern



### by Howard V. French

This attractive and unusual lantern is sure to be a great focus of attention. It's sturdy and useful, and not too difficult to make. Small scraps of good woods are all you need for one or a pair—the largest piece required is ¾" thick X 5½" in diameter.

The chimney or globe can be cut from a bottle or jar by using a diamond–coated blade in your hacksaw frame. The finished height should be 5¼" and the diameter can be between 3" and 3¹¹⁄₁₆". Do not attempt to saw straight through the glass. Mark the line of cut by wrapping masking tape around the glass, top and bottom. Rotate the glass in stages while sawing a preliminary indentation all the way around the circumference. Continue rotating and cutting at both ends until you're nearly through before making a final parting cut. Do not exert angular (sideways) pressure on the blade while cutting.

Sand the cut ends to leave a smooth, nick–free surface. If you use a belt or disc sander, don't overheat the glass, which could break it. A safer method might be to secure a sheet of medium–grit paper to the top of your saw table with double–sided carpet tape. Then sand the edges of the glass by scouring it in a circular motion.

I used a Planter's Peanut jar because of its attractive embossed design and convenient size. Choose your own jar and size the groove in Disc F to accommodate its outside diameter. Adjust the lengths of the posts (J) if needed.

The main components of the lantern are two stacks of discs that make up the base and the lid as shown in the Side View on the next page. Cut eight 5½" diameter discs and three 3" discs from ¾" oak or other hardwood. Before you cut the 3" discs and while the piece is still square, drill ½" through–holes in the edge of Discs E and H as shown in the Side View. Drill a ⅜" hole in one of the large discs (C) and a 1½" hole in all the others except the small disc that will be at the top (I). Use a Forstner or spade bit and stack the discs as shown.

Glue up the blanks for the base and the lid. As you arrange the discs, observe the proper relationships between the holes drilled in their edges.

Fasten the lathe faceplate to the base at Disc A and turn the base to match the photo and illustrations. When finished, do the same thing to the lid, attaching the faceplate to Disc G. Cut the two posts from ⅝" diameter dowel rod, and turn the ends as shown in the Post and Disc Details. Sand them smooth and check for a slip fit between their tenons and the holes in Disc F.

Glue the post tenons into the holes in Disc F. Be careful not to get glue on the exposed surfaces. If you do, wipe if off immediately with a wet rag or sponge. Don't glue the tops of the posts into Disc G. Just countersink for screws; this is how you'll access the bulb.

Finish all the exterior surfaces except for the bottom of Disc A. I applied successive coats of clear to bring out the natural beauty of the grain. You could try translucent or opaque colors, or even a brass finish. If you decide to paint the lantern, apply a sanding sealer first.

The electrical components are readily available and easy to assemble, as shown in the illustration. I chose a yellow "flame" type bulb because I was looking for atmosphere rather than brightness. The design allows for adequate ventilation if you want to use a bigger bulb. Slip the globe into place between the posts, put the lid on, and secure it with two flat head wood screws. Form the bail by bending a length of 3⁄32" brazing rod or coat hanger wire—remember to allow for "spring–back" of the wire.

Finally, cut a 5¼ circle from felt and glue it on the bottom of the base. Fabric stores have felt in different colors and may have it with peel–and–stick adhesive on one side. Your lantern is ready for display and a long life of service, so plug it in. PW

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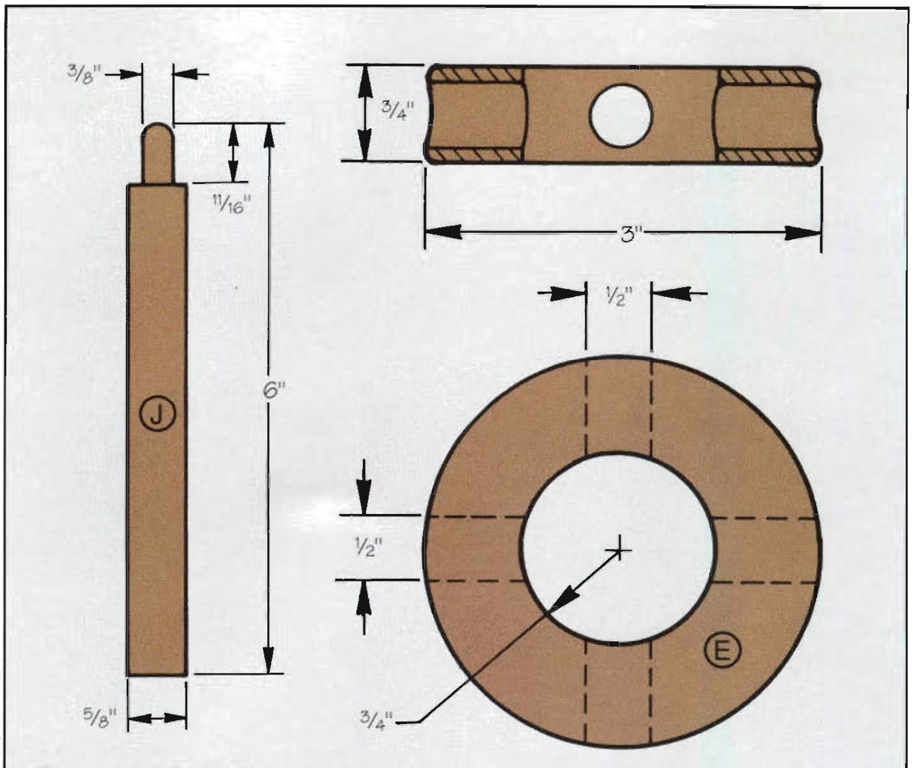
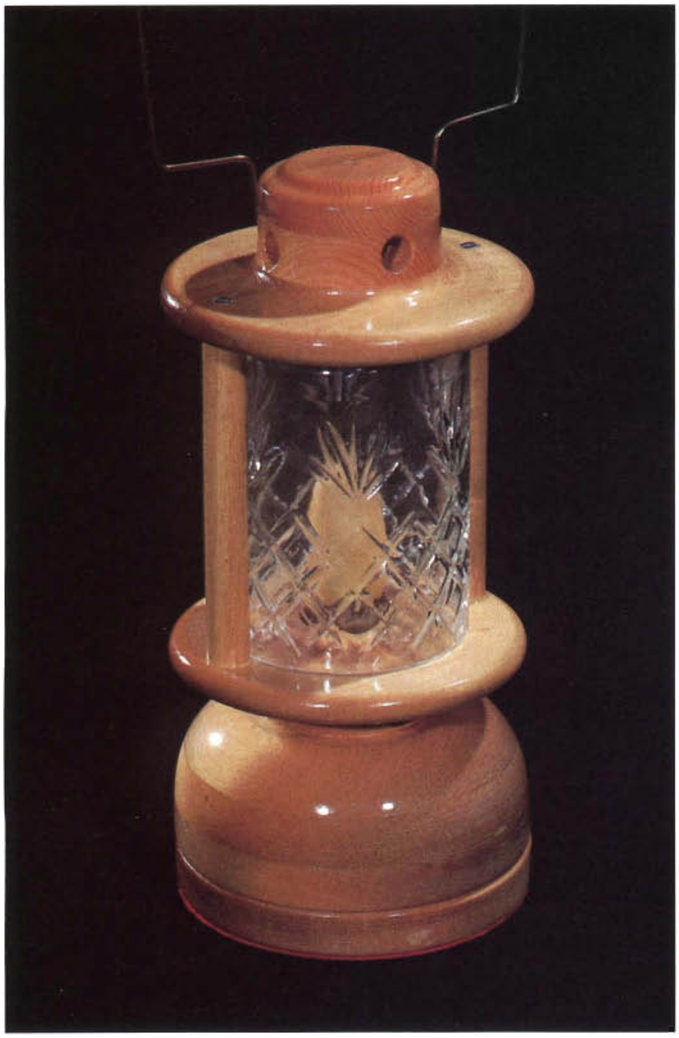
***Howard V. French** of Abilene, Texas is a long–time contributor to* Popular Woodworking, *and the author of* Gifts from Grandpa's Workshop *(TAB Books).*

| Supplies | |
|---|---|
| 1 | 3/32" diameter brazing rod or stiff wire |
| 1 | glass jar or bottle |
| 1 | keyless lamp socket |
| 1 | 3/8" X 1 3/8" threaded nipple |
| 1 | 3/8" thin hex nut |
| 1 | 3/8" flat washer |
| 2 | 18–22 gauge wire nuts |
| 1 | in–line switch |
| 1 | six to eight–foot lamp cord |
| 1 | outlet plug |
| 1 | 5 1/4" diameter piece of 1/16" felt |

illustrations by Bob Chapla



Post and Disc Details



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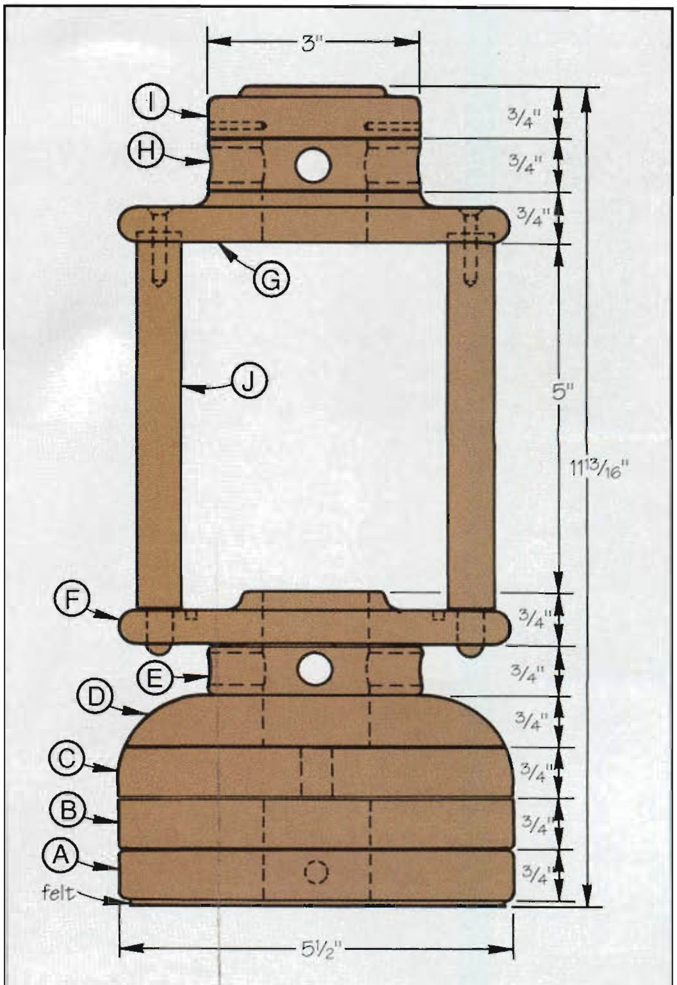
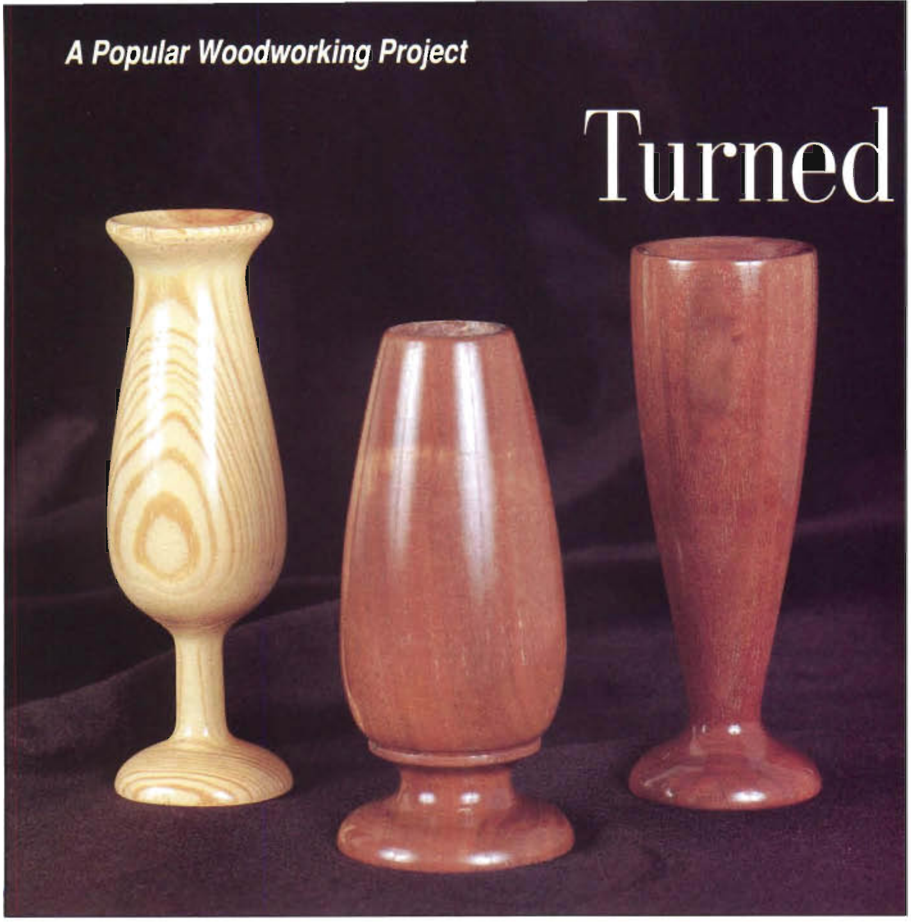


Side View

A Popular Woodworking Project

# Turned Bud Vases



### by Devore Burch

I give regular woodturning demonstrations at a local hardwood dealer, and each time I try to make something unusual while using tried and true turning principles. These bud vases are a good example and have stimulated lots of interest.

First prepare the rough blocks. The vases above (and those whose patterns are included in the PullOut™ Plans) require blocks in two sizes: 1¾" X 1¾" X 5½" and 2¼" X 2¼" X 5". Drill a ¾" diameter hole 3" deep down the center of the longer blank, and a 1" diameter hole 3½" in the shorter blank. Cut them to size and bore the hole to the proper depth as indicated in the Figure.

To turn the blanks you'll need to make a simple mandrel, turned as shown below. After turning the mandrel, cut off one end and insert it into the hole in the rough bud vase blank. Place the unbored end on the live center of the lathe and push the tail stock end of the lathe against the other end of the mandrel. The vase is now ready for turning. Your choice of woods and shapes for the vase is almost limitless. You'll find full–size turning templates for eight different designs in the PullOut™ Plans in the center of the magazine, but you may like your own better.

After sanding through 320–grit paper, apply a wax or other appropriate finish.

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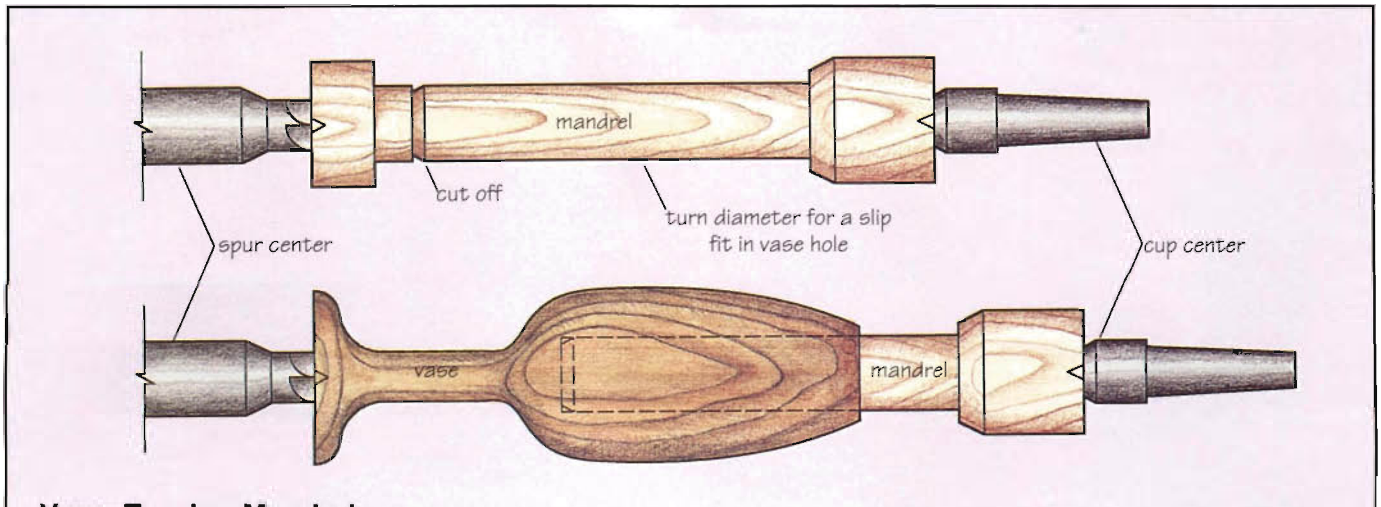
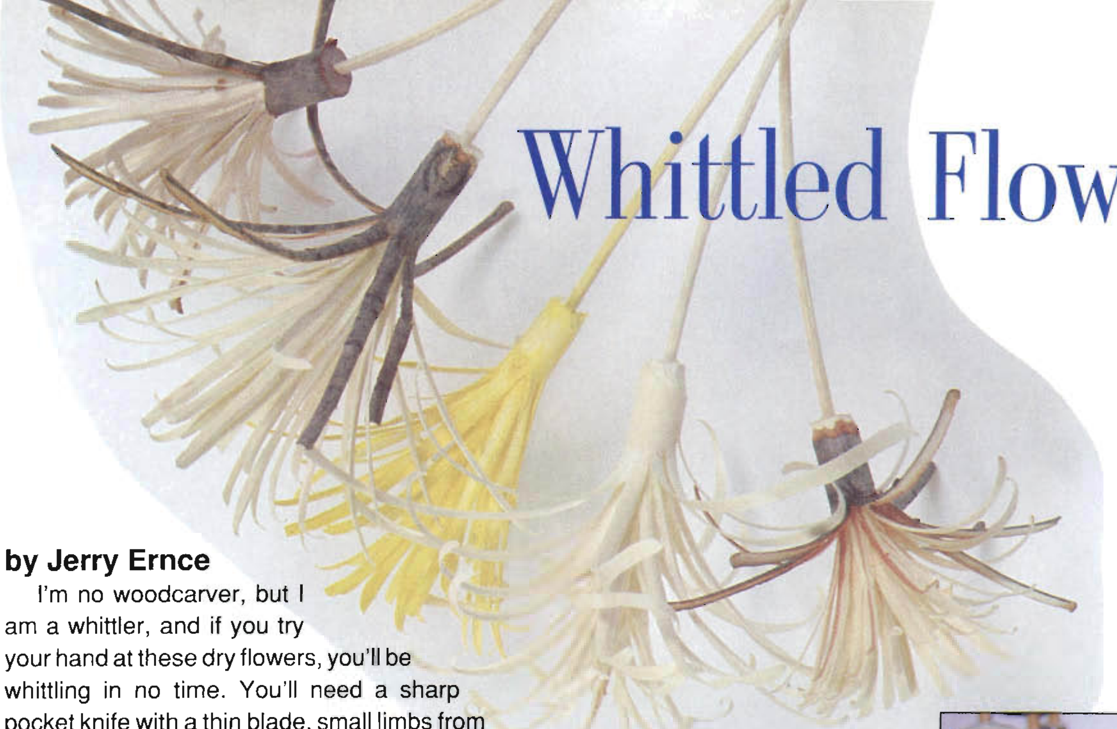
***Devore O. Burch** is a woodworker in Fort Worth, Texas and a frequent contributor to* Popular Woodworking.



**Vase–Turning Mandrel**

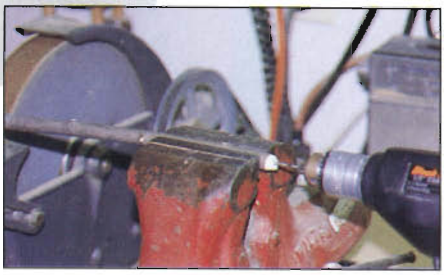
# Whittled Flowers



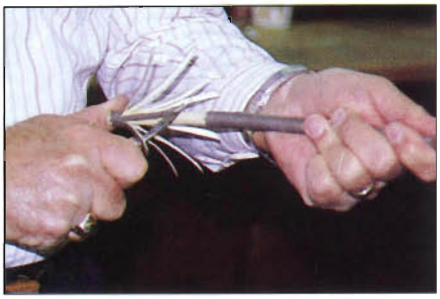
### by Jerry Ernce

I'm no woodcarver, but I am a whittler, and if you try your hand at these dry flowers, you'll be whittling in no time. You'll need a sharp pocket knife with a thin blade, small limbs from a soft maple tree and some #2 (1.75 mm) reed cane. Not everyone has a yard full of soft maple, so use what you can find. Select a light color wood if you think you might want to tint the flowers later.

Cut a small branch about ⅜" in diameter and strip the leaves. I've found that a fresh limb whittles more easily and the finished flowers are more durable. Square the cut end and drill a 3⁄32" hole about ¼" deep in it for the stem. For an all–white flower, clean the bark off the limb before whittling; leave the bark on for a more natural effect.

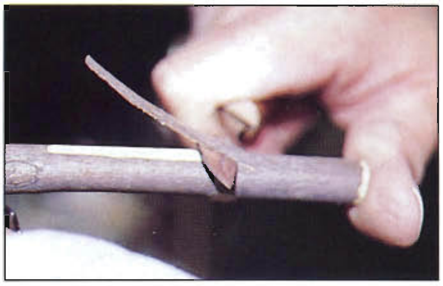


If you're right–handed, hold the limb in your left hand 10" to 12" from the bottom end and pick up a sharp knife in your right hand. Place your right thumb on the end and use your fingers to move the blade up the limb as far as comfortably possible. Slice lightly into the limb. Pull the knife towards your thumb, peeling back just the bark. Stop about ¼" from your thumb.

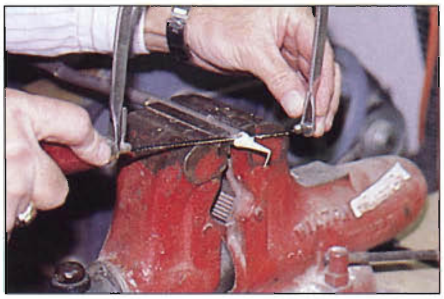


Purchase #2 reed cane from your hobby shop for the stems. I cut 6" and 8" lengths to match the vase depth. Push the stem into the hole in the end—as the flowers dry, the contracting wood grips the stem.

Square the end of your original limb again, drill the hole, and keep whittling until you have enough flowers to fill your vase. Keep the whittled petals pushed down so the flower will look full while it dries.



Work between the leaf knots where there's clear wood, all the way around the limb until all the bark is peeled back. Do the same to the sapwood, working and twisting with your left hand until you've cut through the heartwood and the flower falls free. Make your cuts fairly thin—the more petals, the fuller the flower. However, if they're too thin the petals won't have any strength. Practice makes perfect.



If you'd like to tint your flowers, spray them with food coloring in a trigger spray bottle. The color will fade in about a week to a soft pastel color, giving a natural look.

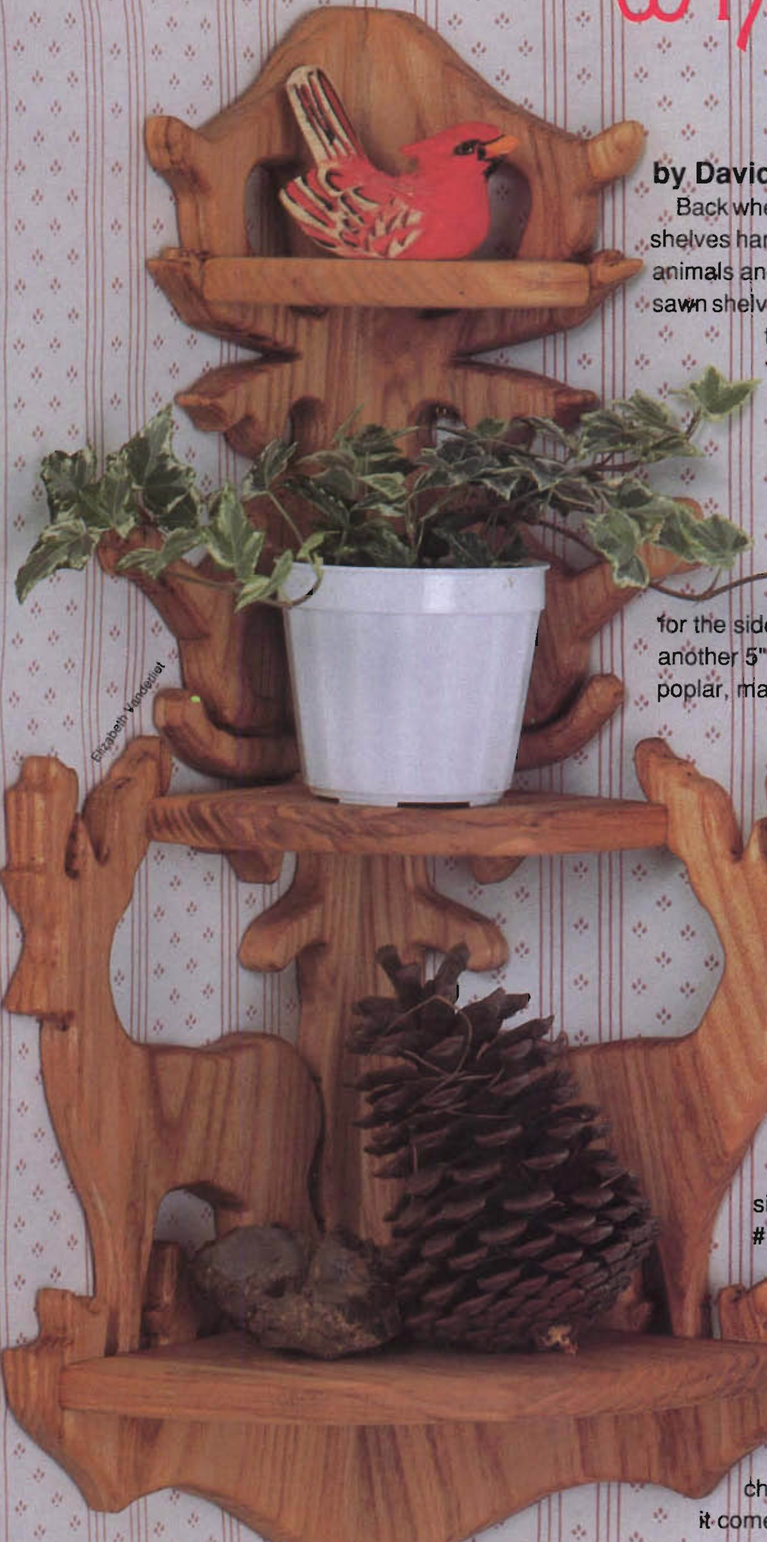
Another consideration is size—slice the petals to a length appropriate for the vase you plan to use. I make the petals about 3" long for a large vase and 2" for a small one.

If you'd like a little more curve to the petals, clean off the bark and let the limb dry overnight before carving. However, if the wood is too dry, the petals will be easily knocked off. Let them finish drying after carving—they'll be more durable and able to take everyday wear and tear.

If your first flower doesn't look as fine as you'd like, don't give up. My first didn't look like much. In fact, it got a big laugh or two. But the more flowers you whittle, the better they'll get. Hang in there and remember it's just one more woodworking skill you're acquiring. PW

*Jerry Ernce is a woodworker in Broken Arrow, Oklahoma.*

# A Corner Whatnot Shelf



Elizabeth Vanderliet

by David F. Black, Jr.

Back when I was a child, every home we went into had little whatnot shelves hanging around full of salt and pepper shakers, little ceramic animals and "whatnots." I would sit and look in awe at the little scroll sawn shelves. In those days you could buy the shelves and the things to go on them in the local 5 & 10 cent store; but if you are under thirty-five years old, you've probably never been in a 5 & 10 cent store.

Here is a whatnot shelf similar to those of days gone by, that can be finished in one evening and enjoyed for generations to come. They can also be great little money–makers for those who want to sell them at craft shows.

Start by cutting two pieces of ½" thick wood 7" X 19" for the sides. Then for the three shelves cut one piece 6" X 6" and another 5" X 5" and a third piece 3" X 3". I choose to use birch, but poplar, maple, or many other types of wood would do fine.

Make a cardboard or posterboard template from the full–size pattern in the PullOut™ Plans section. Now transfer the pattern to the wood offsetting it by ½" on one piece so it will extend the same distance from the corner when the two pieces are joined together.

Now for the fun part! After you get all of your patterns transferred to your ½" wood, cut them out with the finest scroll saw blade you have. The finer the blade you use, the less sanding you'll have to do later. After you get all the sides and shelves cut out and sanded, you're ready to put the shelf together.

Apply a thin layer of woodworkers' glue on the edge of the narrow side and butt it against the face of the wider side. To hold the sides while the glue dries, put a few ¾" X #18 brads through the long side into the short side. After securing the two sides together put a little glue on the edges of the shelves and locate their position according to the full–size plan. Set the shelves in place, and again use a couple of brads to help hold them while the glue dries. Be sure to clean off any excess glue with a damp cloth before it dries.

Now the shelf is ready for the stain or finish of your choice. I usually use Formby's wiping stain on my projects; it comes in a variety of colors and is easy to use. PW

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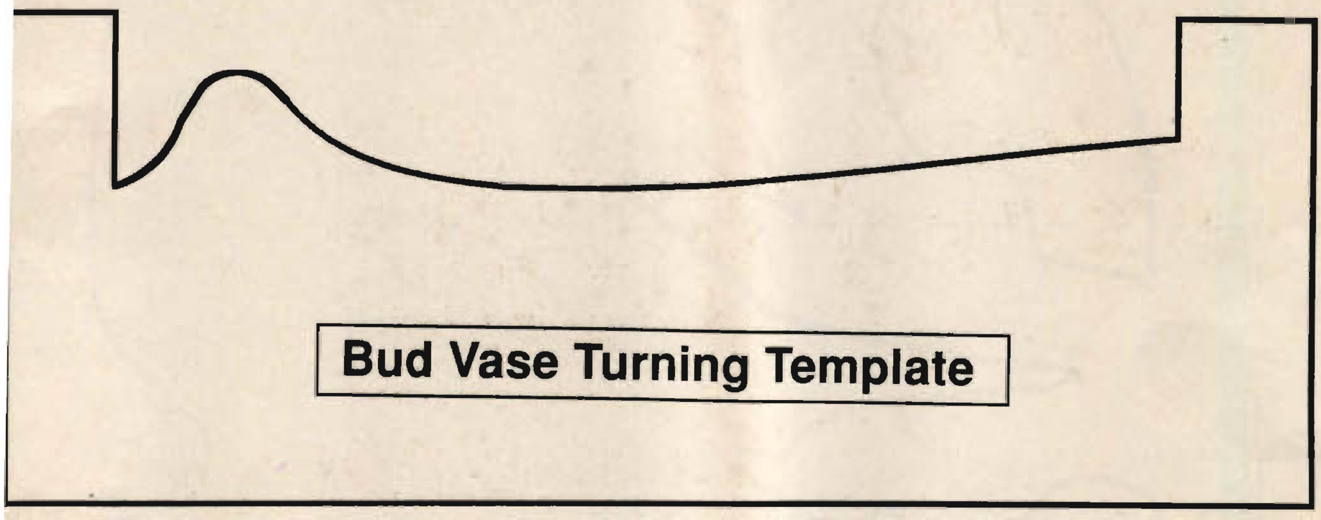
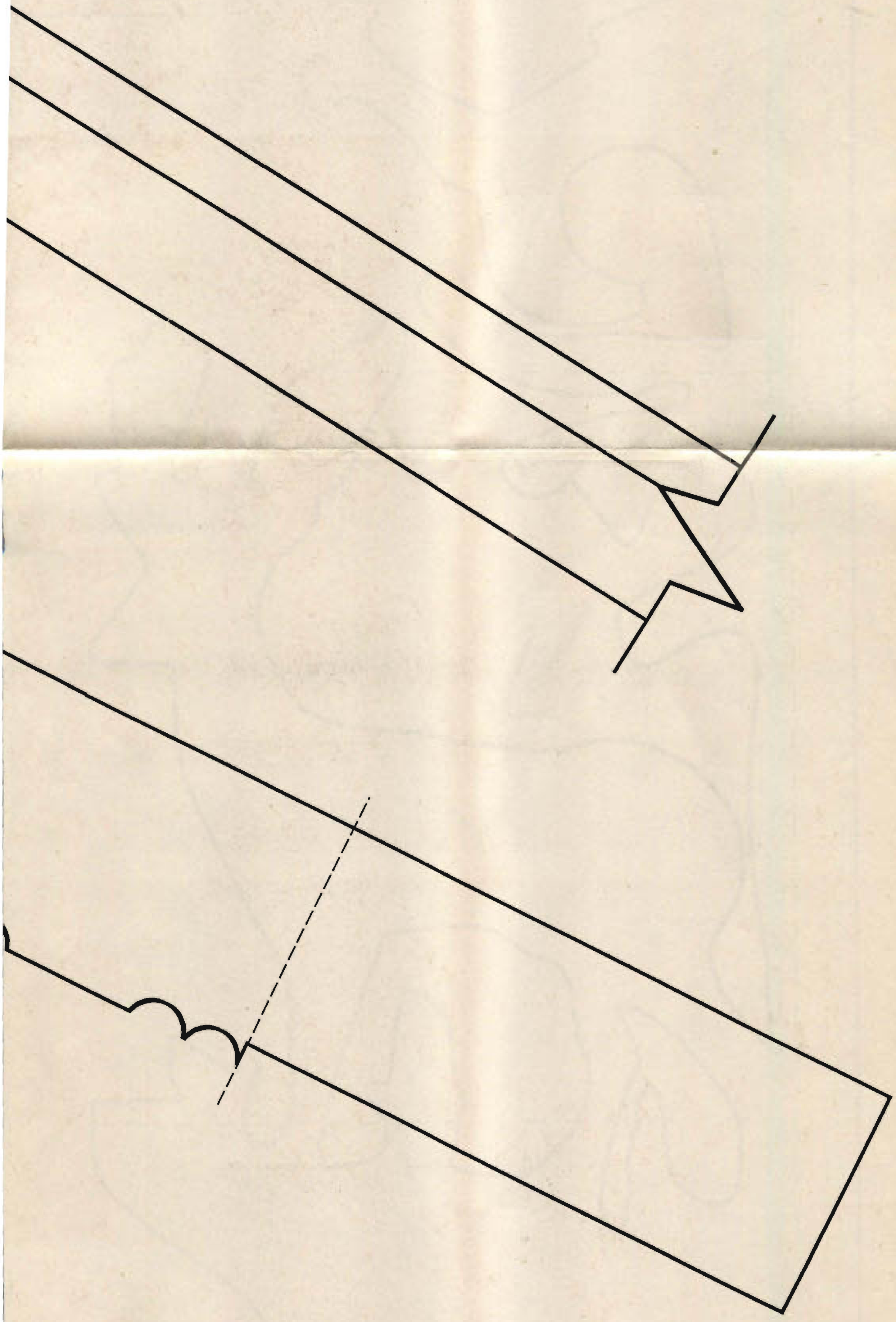
***David F. Black, Jr.** lives in Barnwell, South Carolina.*

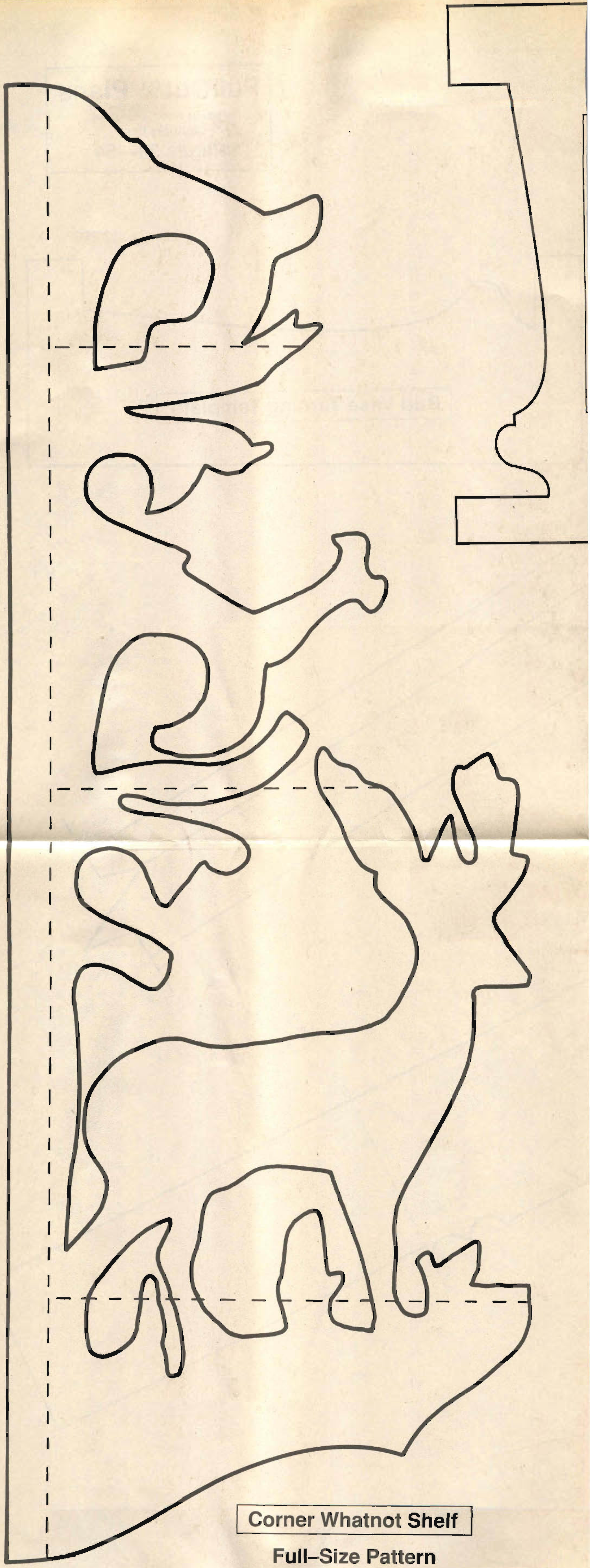
**Full–Size Patterns in the PullOut™ Plans Section**

**PullOut™ Plans**
Popular Woodworking #64
January1992
**Pages 39—54**



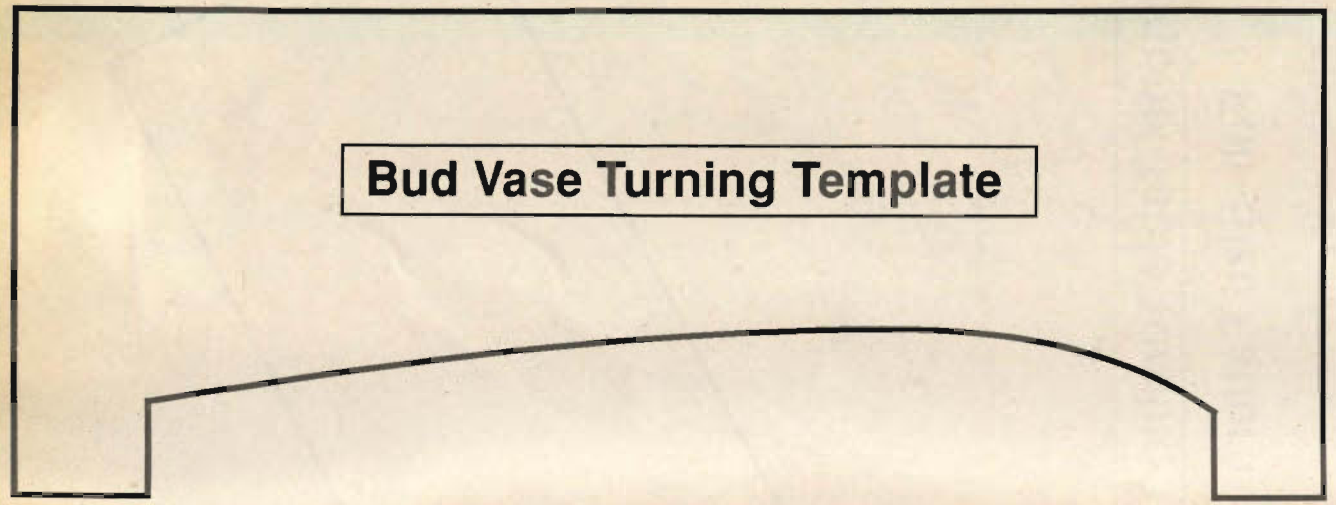
**Bud Vase Turning Template**

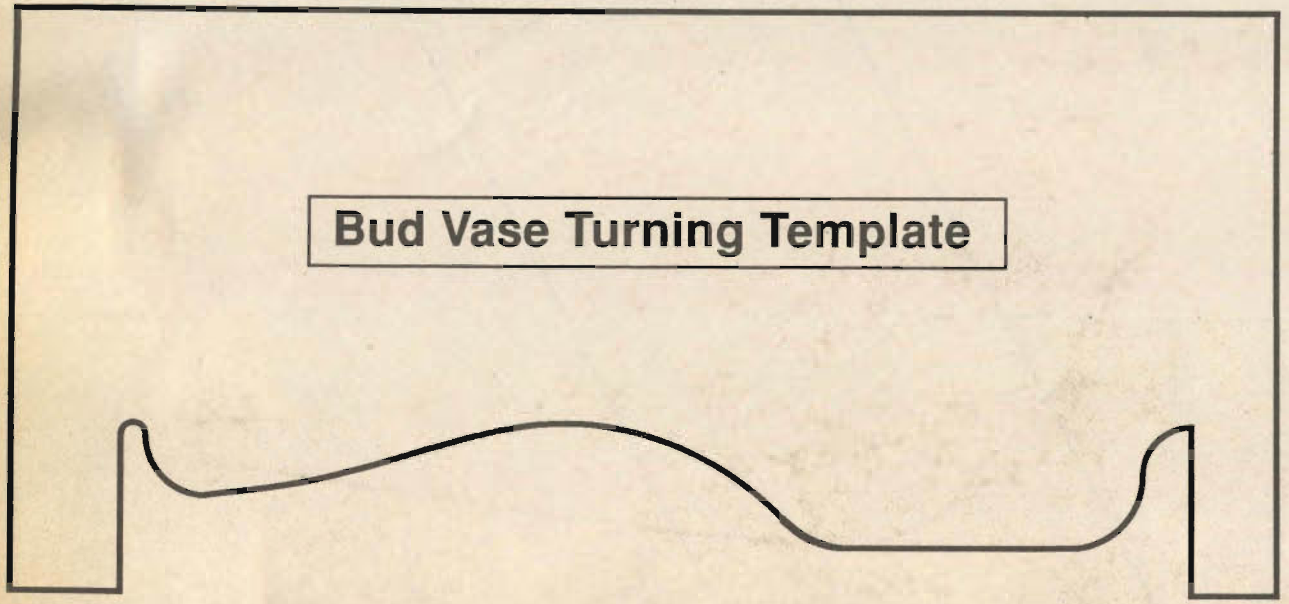


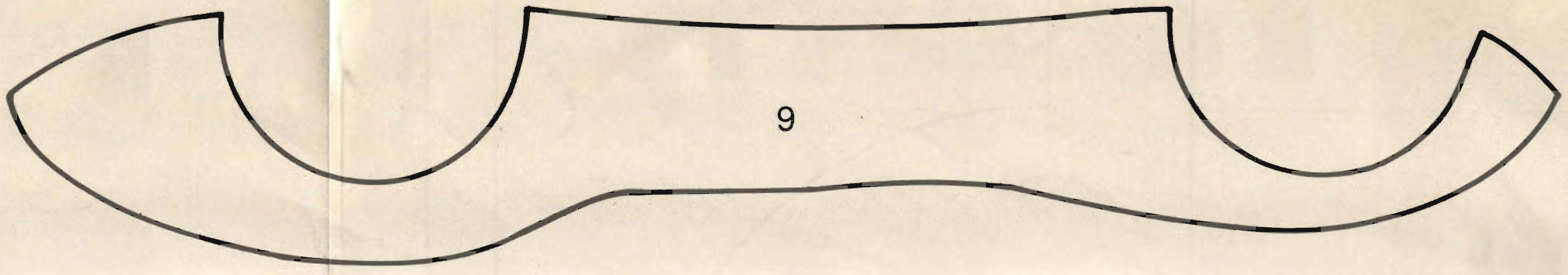


**Corner Whatnot Shelf**

**Full–Size Pattern**

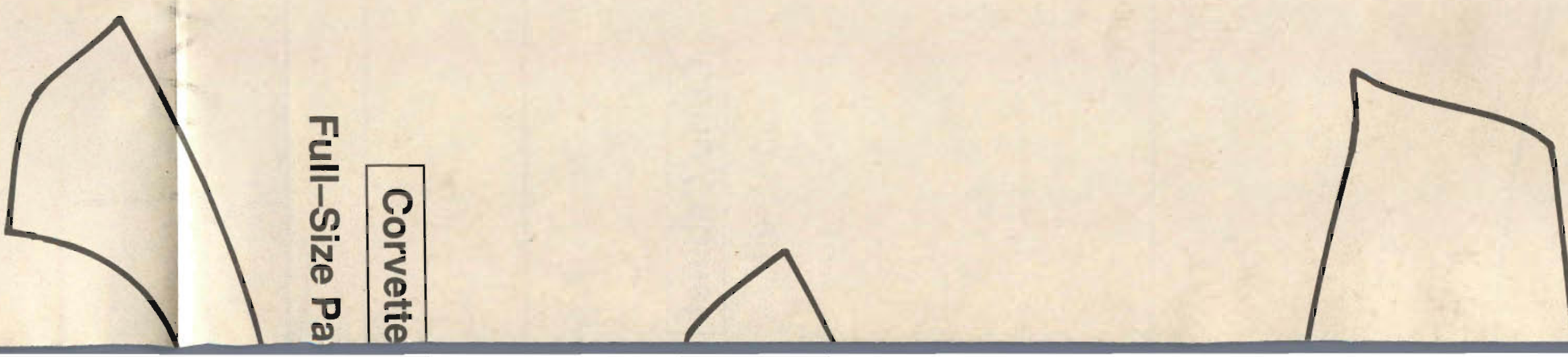






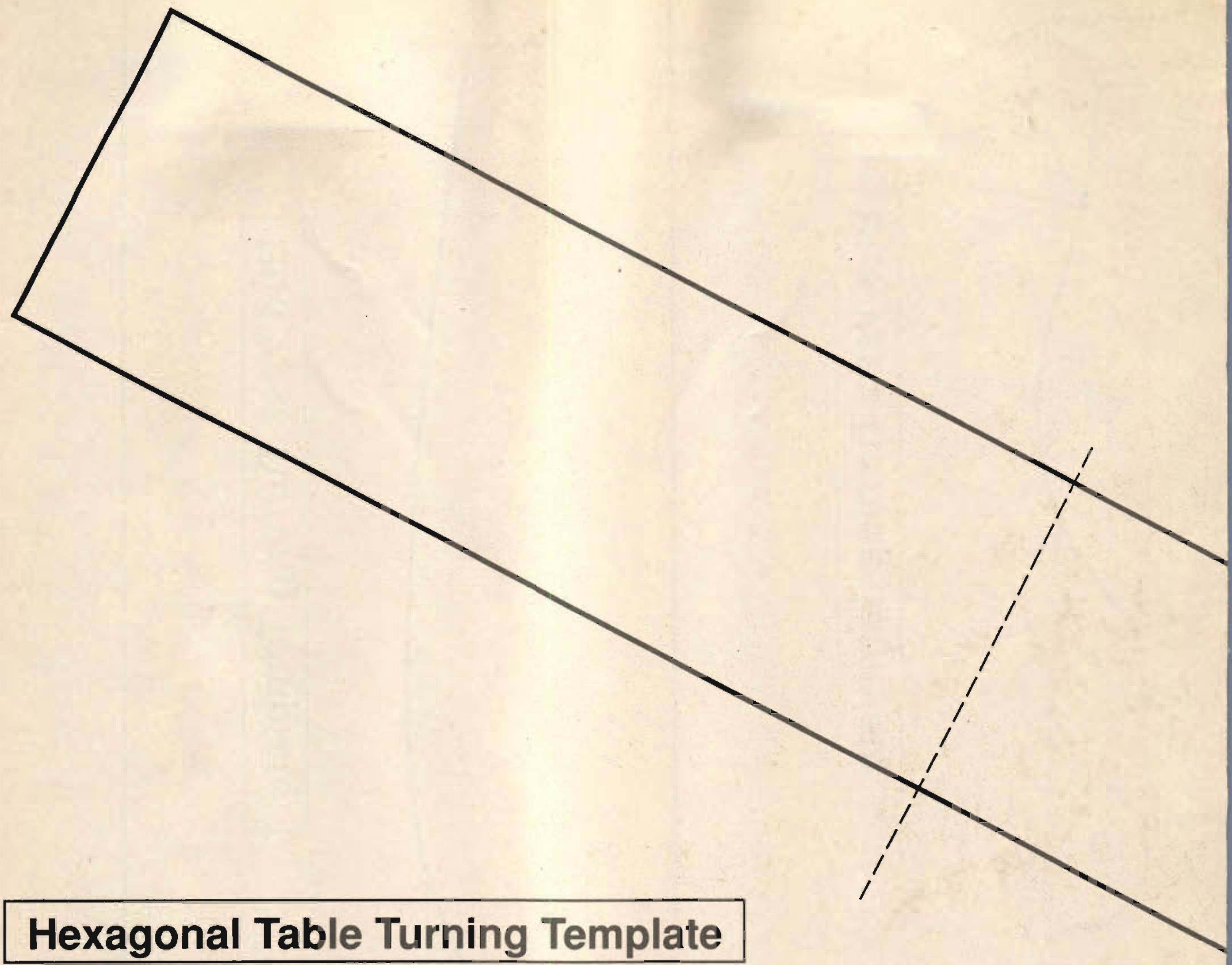
Corvette

Full–Size Pattern



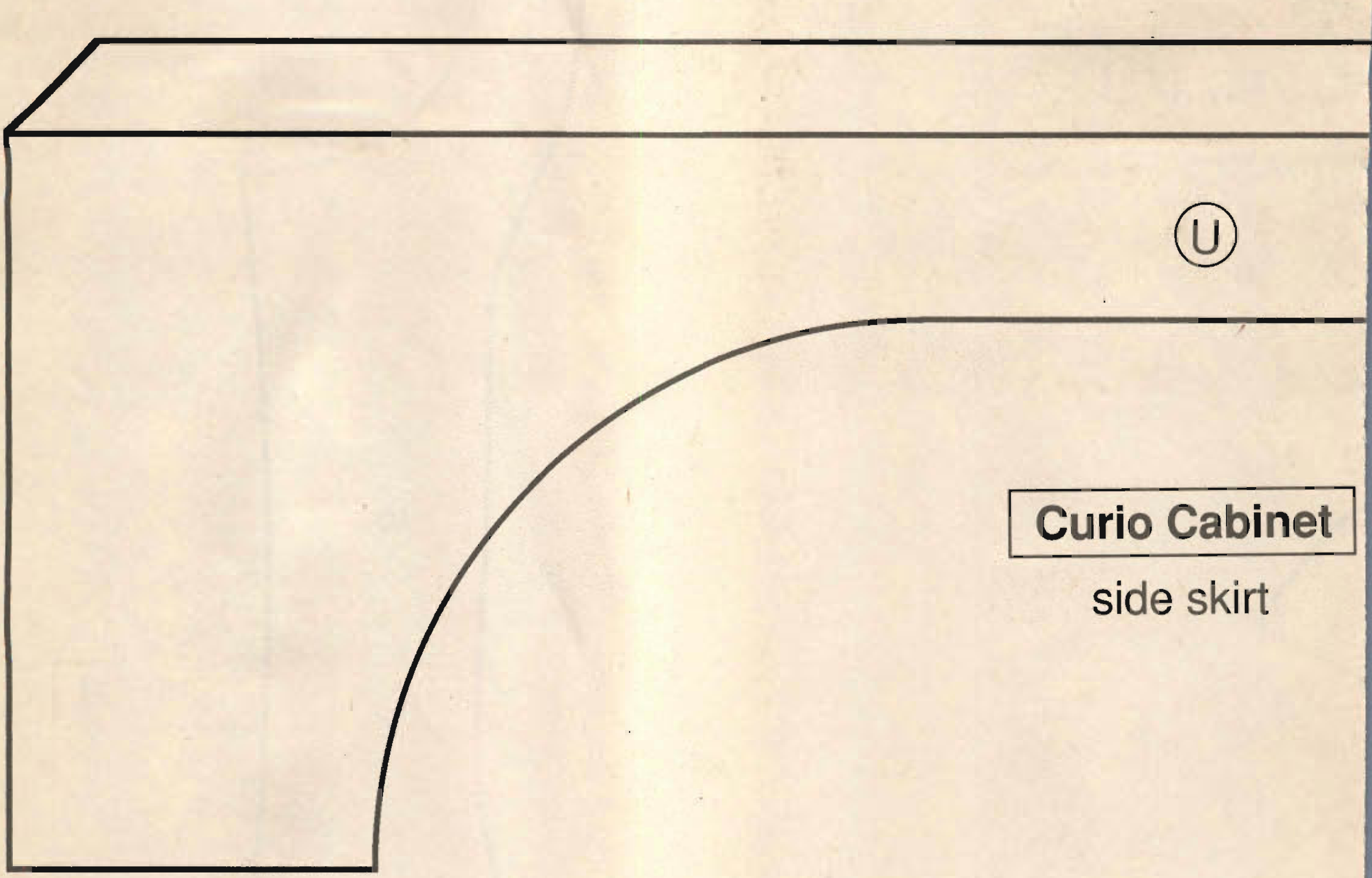
Corvette

Full–Size Pa



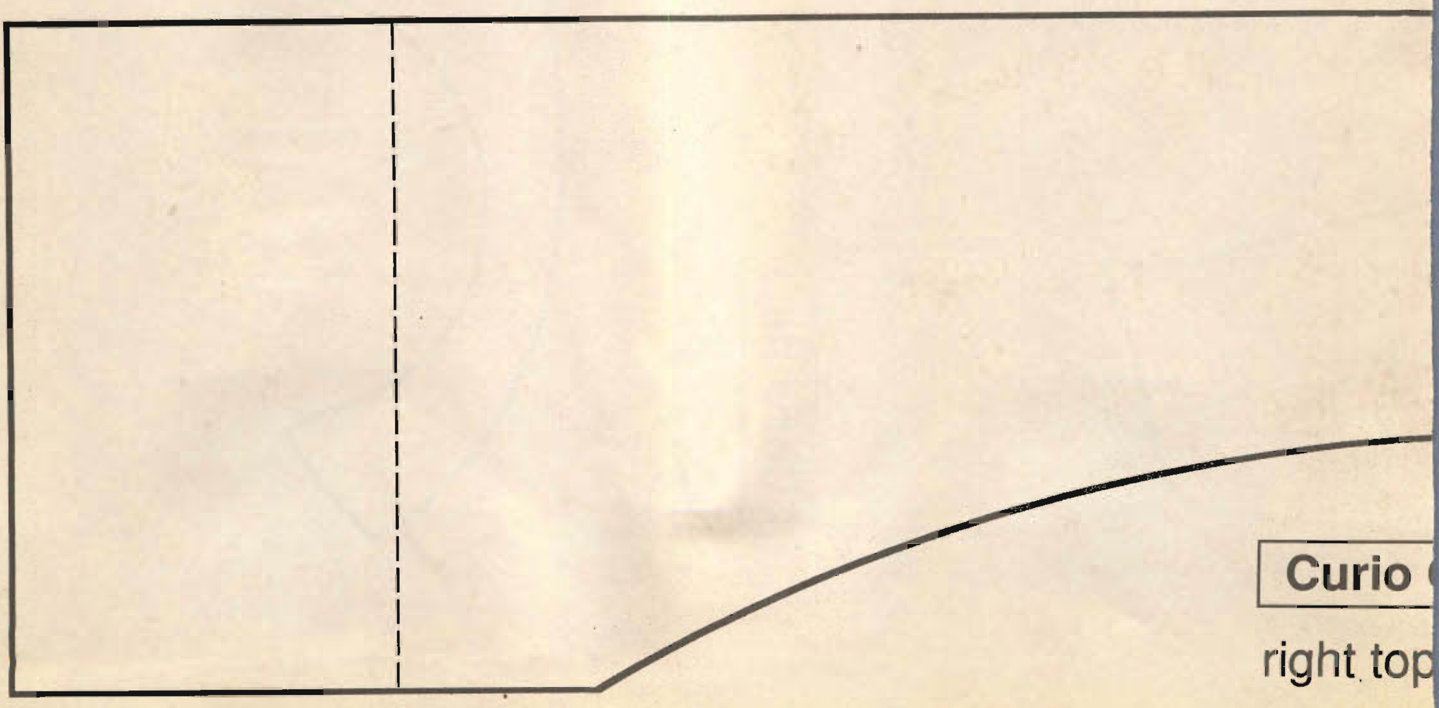
**Hexagonal Table Turning Template**

**Full–Size Pattern**



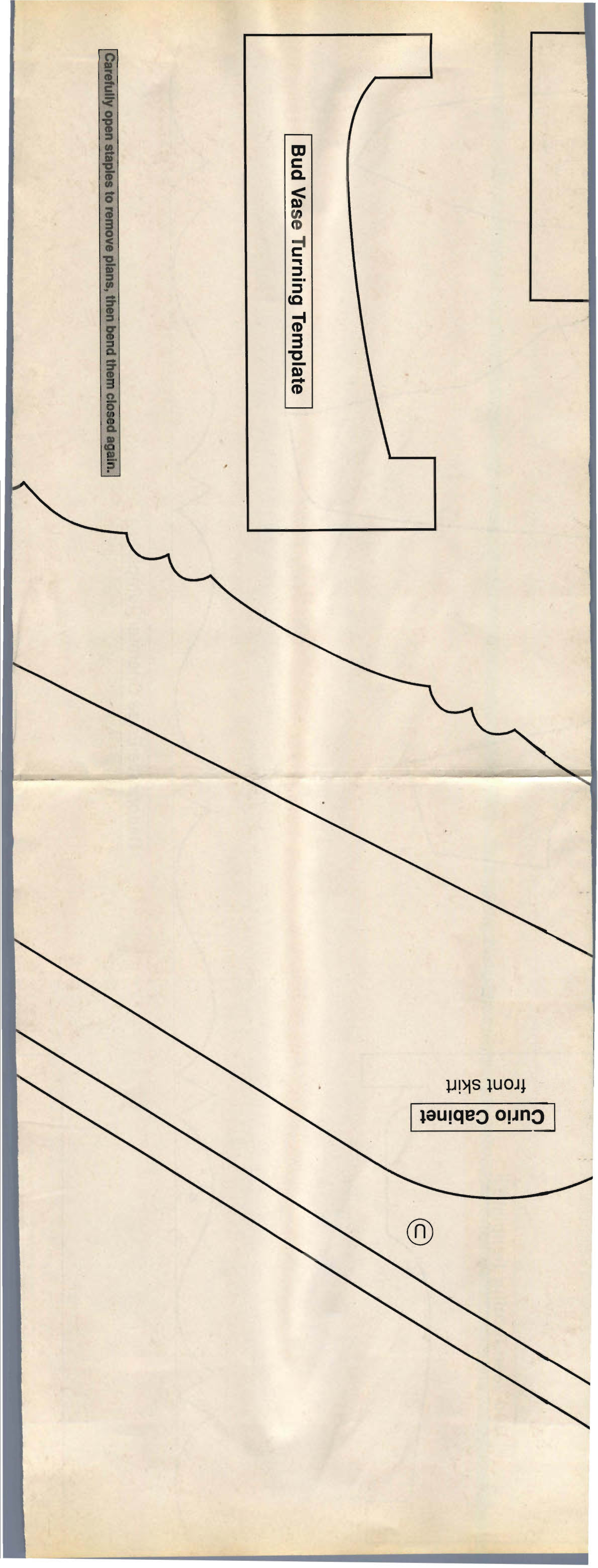
**Curio Cabinet**

side skirt

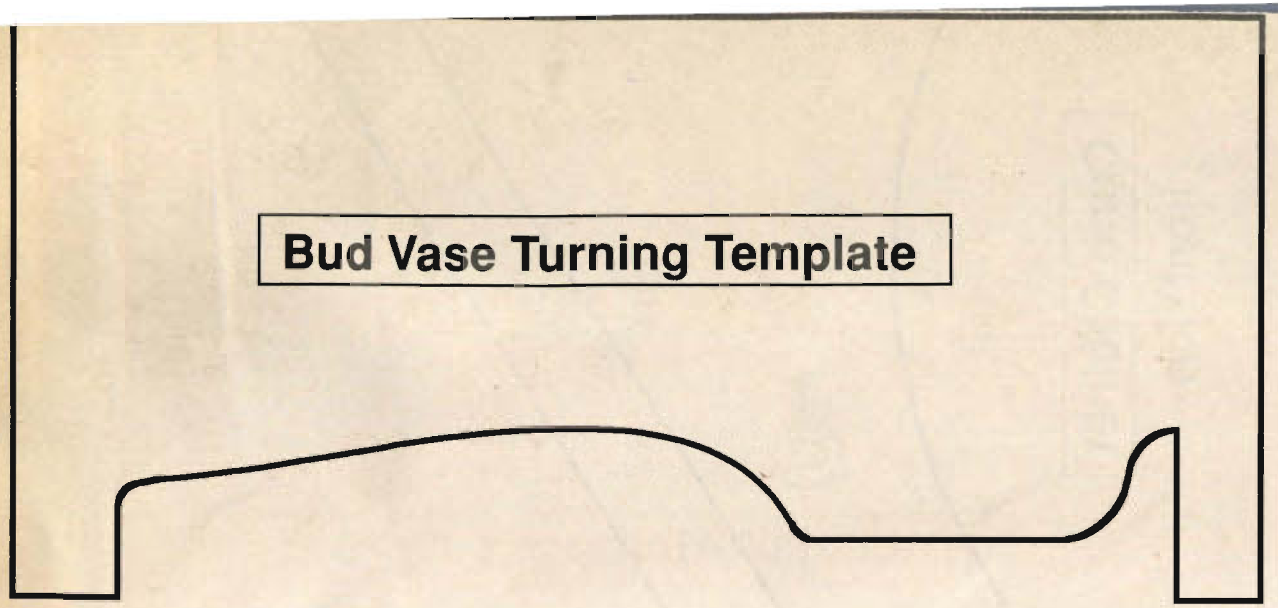


**Curio**

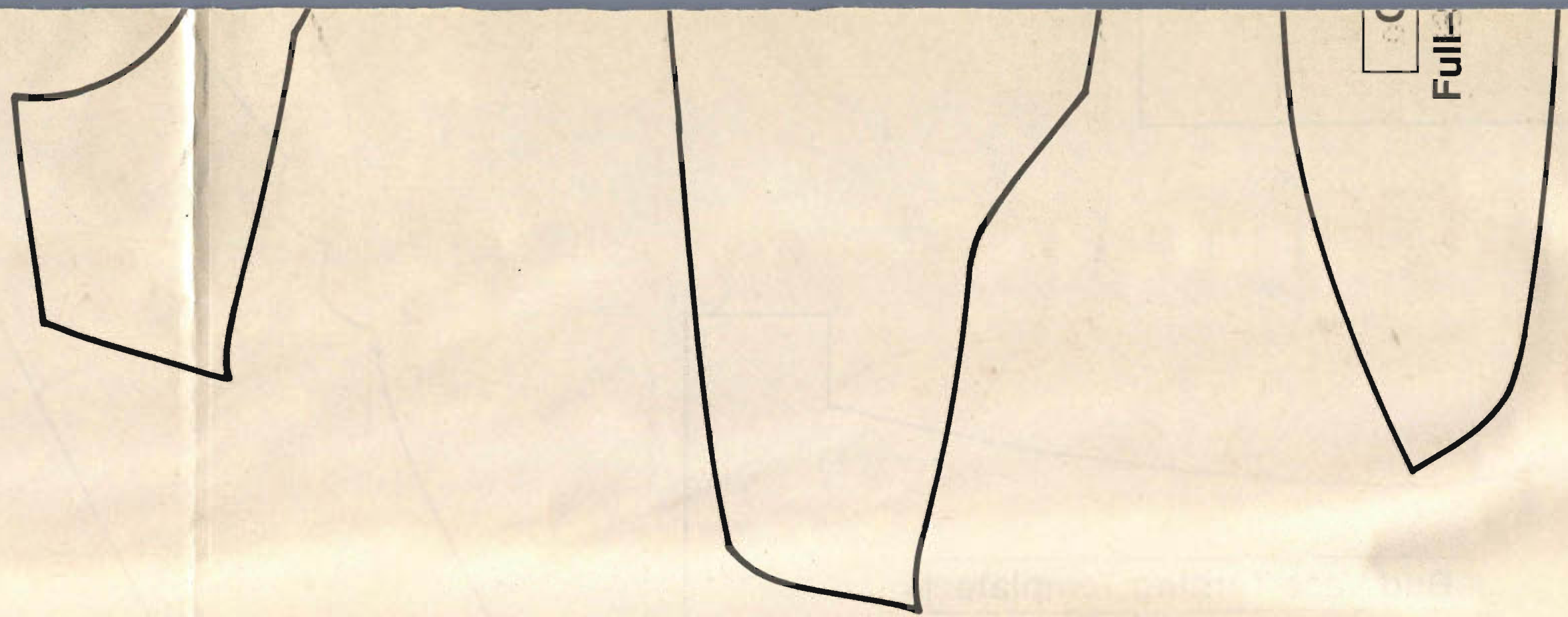
right top

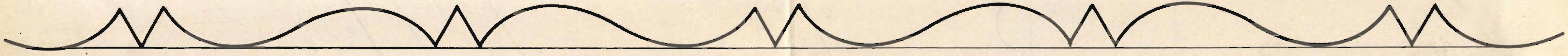


Carefully open staples to remove plans, then bend them closed again.

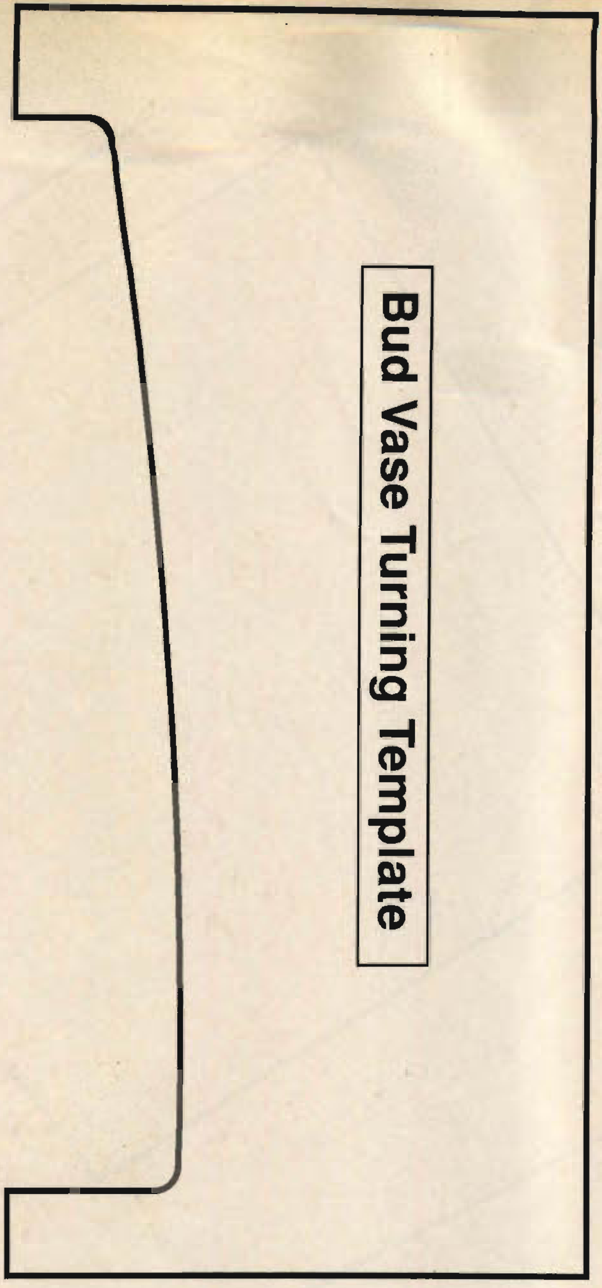


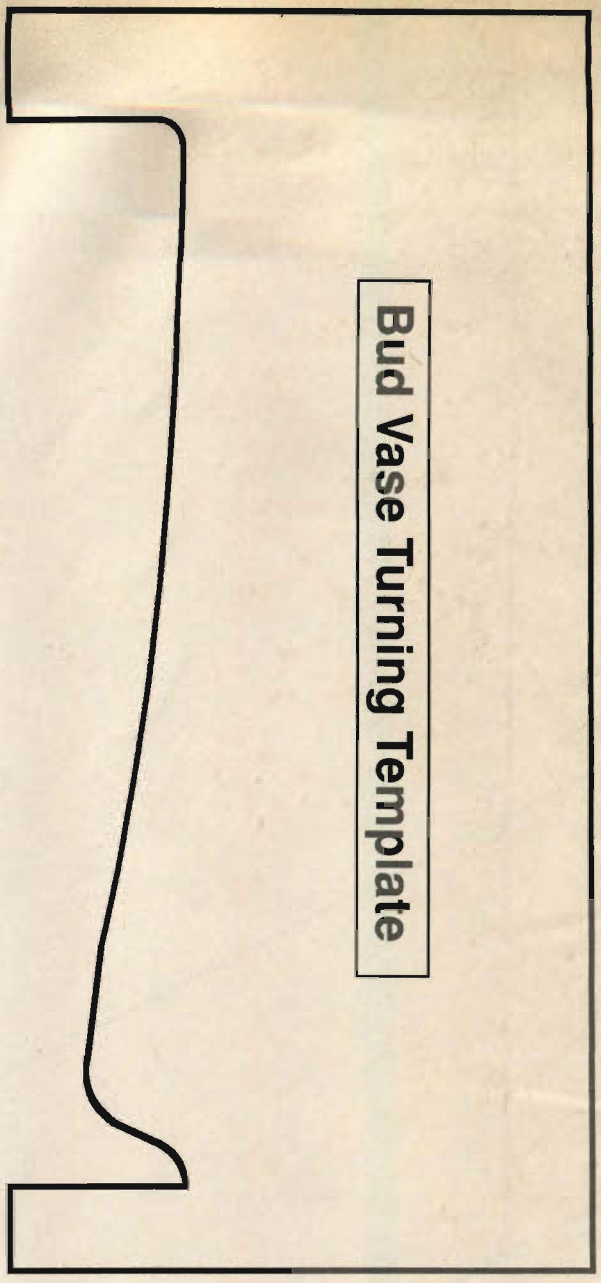
Bud Vase Turning Template





Decorative Edge Chamfer Template


Bud Vase Turning Template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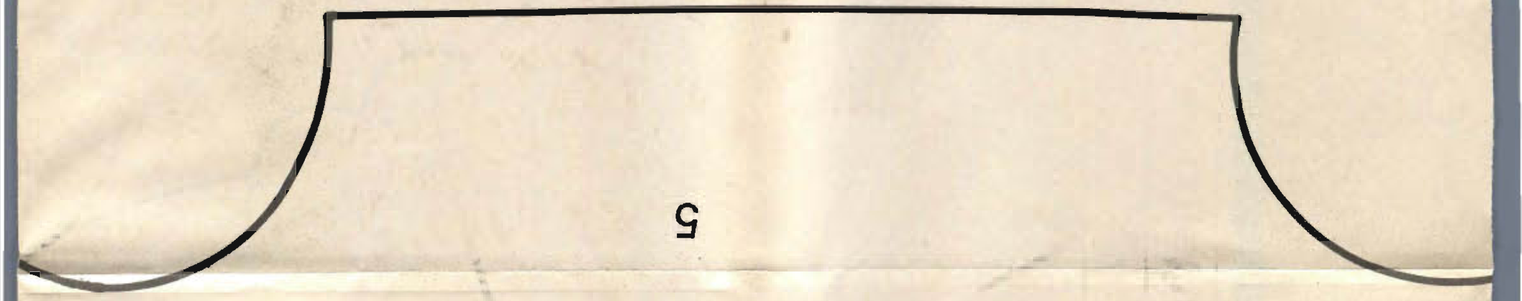
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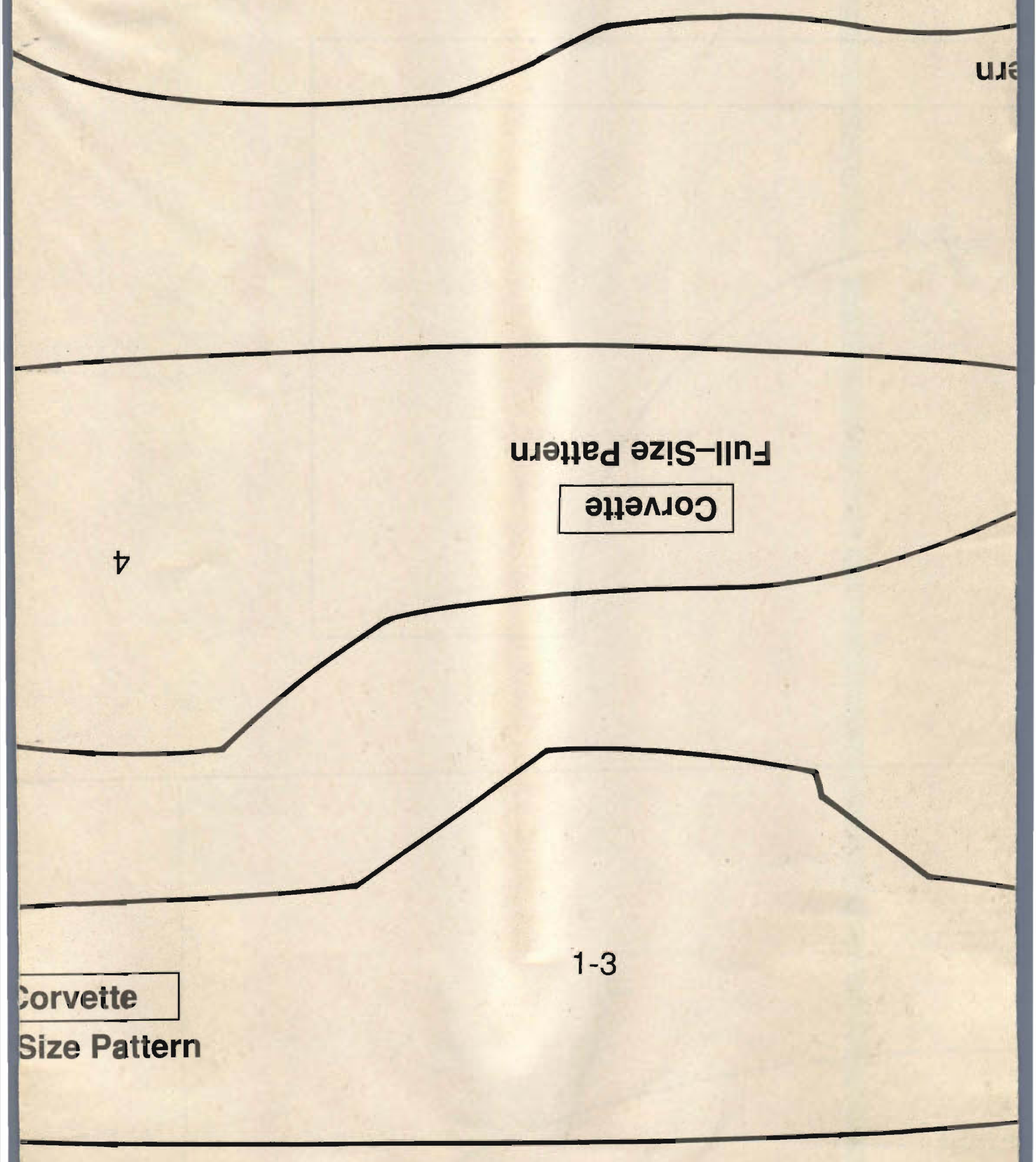
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Full–Size Pattern
Corvette
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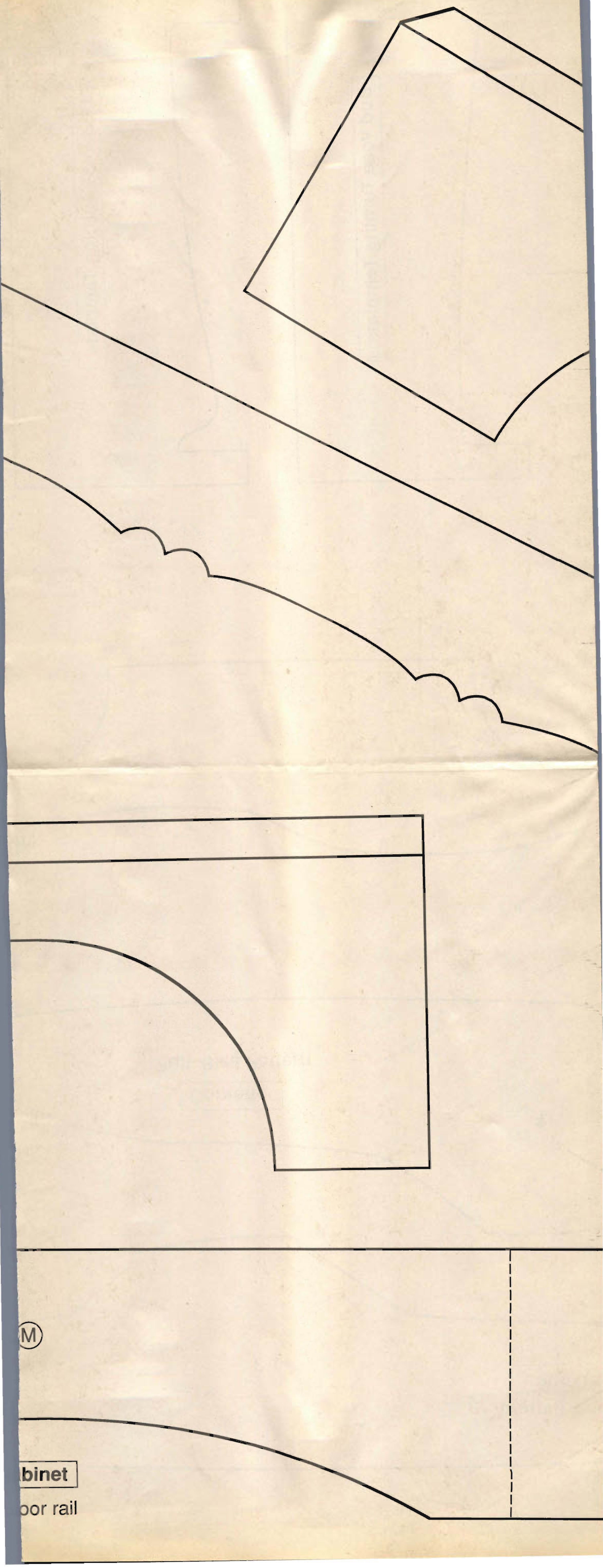
Ⓜ
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Bruce Richmond

# Hexagonal End Table

### designed by Ward D. Paley

This project will produce a beautiful table you'll be proud to display and will give you new insight into the use of the lathe. The legs of your table will be turned on the lathe, but not in the manner you may suspect! Instead of turning each leg separately on its center, all six legs will be swung at once, resulting in spindles that are not round, but rounded squares.

First, a word about wood selection for this project. Along with the finished aesthetics of your table, you must consider the safety factors involved in turning a large piece. Birch, maple, mahogany, and cherry are all suitable. Oak is unsuitable. It chips easily and is tough on your tools. Because you will be turning a large piece with huge horizontal gaps, the chances are high of causing a dangerous tool to be thrown across the shop. We've chosen a combination of maple and cherry for this piece.

## Building the Mandrel

You'll need to make a custom mandrel to turn these rounded square legs (Figure 1 on the next page). Build it by laminating several pieces of a hard, dense wood like oak. Cut five equal pieces of 1" stock to 3⅛" X 36". One or two of these pieces may be made up of shorter lengths.

When laminating the blank for the mandrel, don't position these short pieces next to each other; put a full length board on either side of them. Have two scrap pieces 3½" X 36" at the ready when you glue up the blank and use them to stabilize the edges while the clamps are applied (see the photos below). The edges must be as even as possible; there's only an eighth of an inch to work with in this dimension. Let

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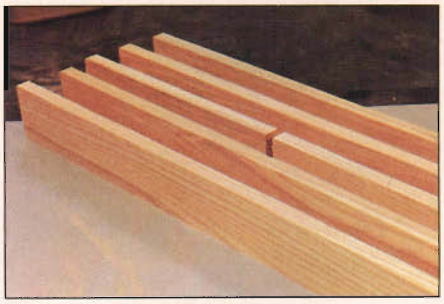
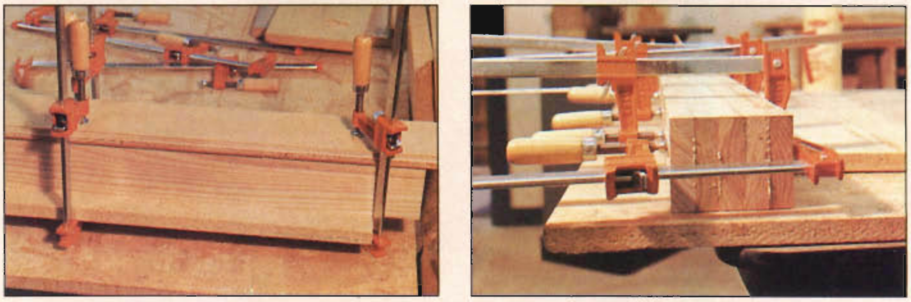
***Ward Paley** works wood in Lockport, New York.*

***If you use short boards to glue up the mandrel, put a full–length piece on each side.***



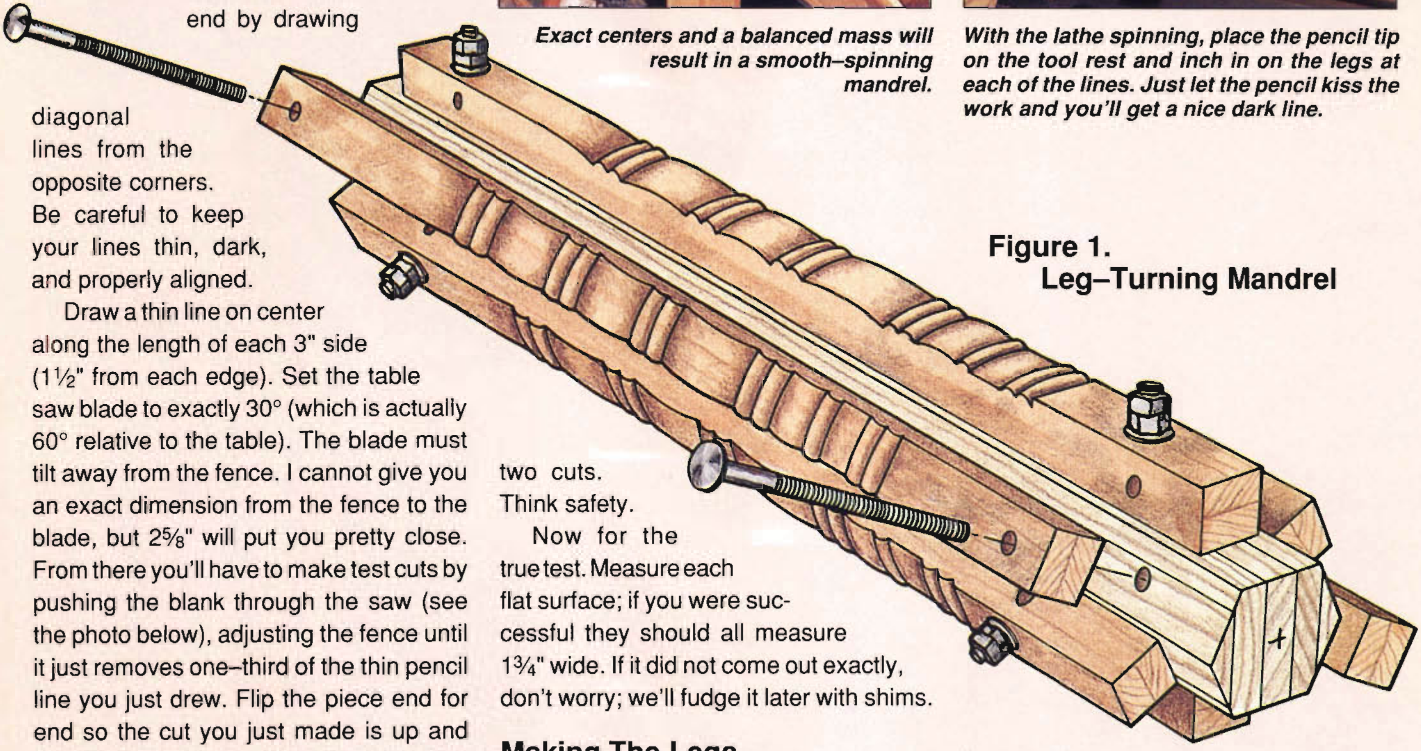
***By first stabilizing both edges with scrap boards, the mandrel pieces won't slip when you clamp the glue joints. After the clamps are tight, remove the scrap.***



the glue dry overnight then remove the clamps and scrape away the dried residue.

Plane or joint one edge flat. With this edge as your reference, plane the opposite edge to make the piece exactly 3" wide. Next, trim the top and bottom surfaces so that the center of the center board stays exactly in the center. This dimension must be exactly 3½". Now you're ready to make the cuts that can totally ruin the mandrel if not thought about carefully—the cuts that turn the blank into a hexagon. As a matter of fact, you may want to make up a practice piece out of pine or fir and experiment on it first.

With the blank now measuring 3" X 3½", square the ends but don't cut it shorter than 34". Find the exact center of each end by drawing diagonal lines from the opposite corners. Be careful to keep your lines thin, dark, and properly aligned.

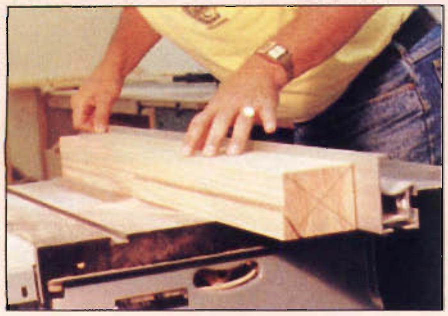


### Figure 1.
### Leg–Turning Mandrel

Draw a thin line on center along the length of each 3" side (1½" from each edge). Set the table saw blade to exactly 30° (which is actually 60° relative to the table). The blade must tilt away from the fence. I cannot give you an exact dimension from the fence to the blade, but 2⅝" will put you pretty close. From there you'll have to make test cuts by pushing the blank through the saw (see the photo below), adjusting the fence until it just removes one–third of the thin pencil line you just drew. Flip the piece end for end so the cut you just made is up and away from the fence. If the line you drew was exactly in the center, another pass through the saw will remove another third of that pencil line.

Roll the mandrel 180° and repeat the two cuts. Think safety.

Now for the true test. Measure each flat surface; if you were successful they should all measure 1¾" wide. If it did not come out exactly, don't worry; we'll fudge it later with shims.

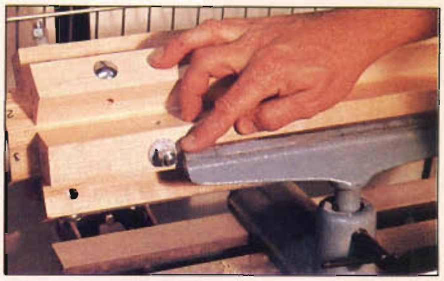


*Take your time. Try to remove only one–third of the pencil line with each pass.*

*Exact centers and a balanced mass will result in a smooth–spinning mandrel.*

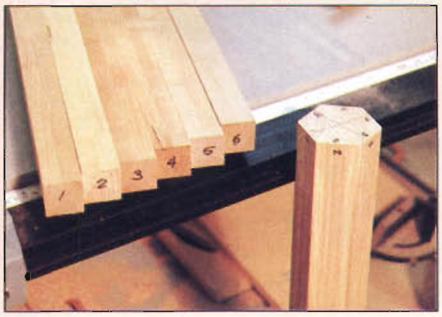
## Making The Legs

Preparing the legs (B) (maple) is a straightforward operation. Cut enough 1" stock 33½" long to rip twelve pieces 1⅝" wide. Glue the leg pairs together face to face, and set all six pairs in the clamps to dry overnight. Hint: lay the legs over three clamps and snug them lightly. Then place another set of clamps on top of the legs alternating

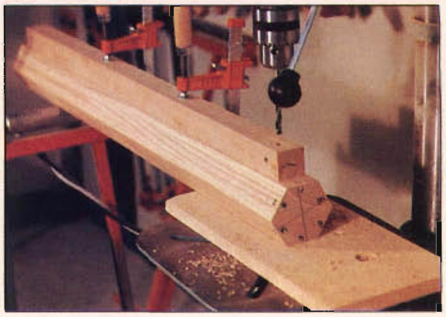


*If I could have attached red flags to these critters, I would have!*

*With the lathe spinning, place the pencil tip on the tool rest and inch in on the legs at each of the lines. Just let the pencil kiss the work and you'll get a nice dark line.*



*Triple–check this step. Aligning the numbers with the grain on the leg ends will help.*



*Level, square, 90°, measure once, clamp. Measure again and drill.*

***Clamp all six legs together and to the panel cutter, shim them perpendicular to the saw blade, and remove the waste.***

between the lower clamps and tighten them lightly. Make sure the wood is resting flat against the upper and lower pipes; then tighten each a little at a time until firm.

When the legs are thoroughly dry, remove them from the clamps and scrape away the excess glue, and finish each leg to 1½" on each side. Trim the best ends and cut them to finished length.

Number both ends of each leg 1 through 6, and number each end of each face of the mandrel. Drill two ⅜" centered holes in

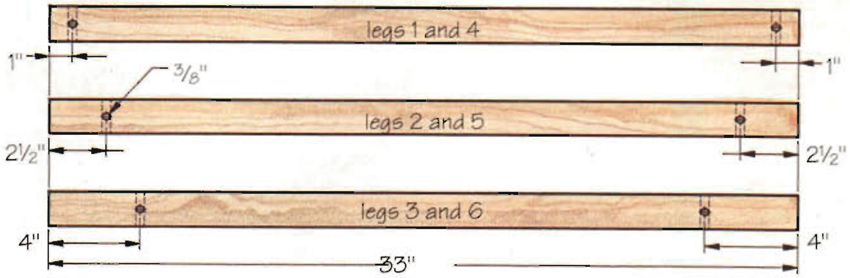


**Figure 2. Hole Locations For Leg–Mandrel Assembly**

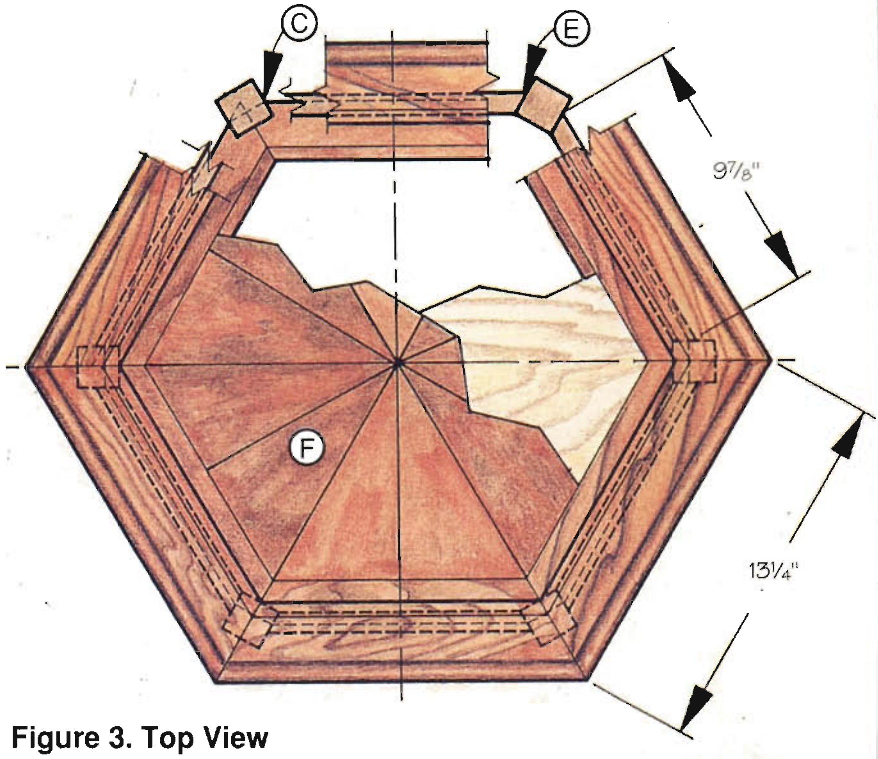


**Figure 3. Top View**

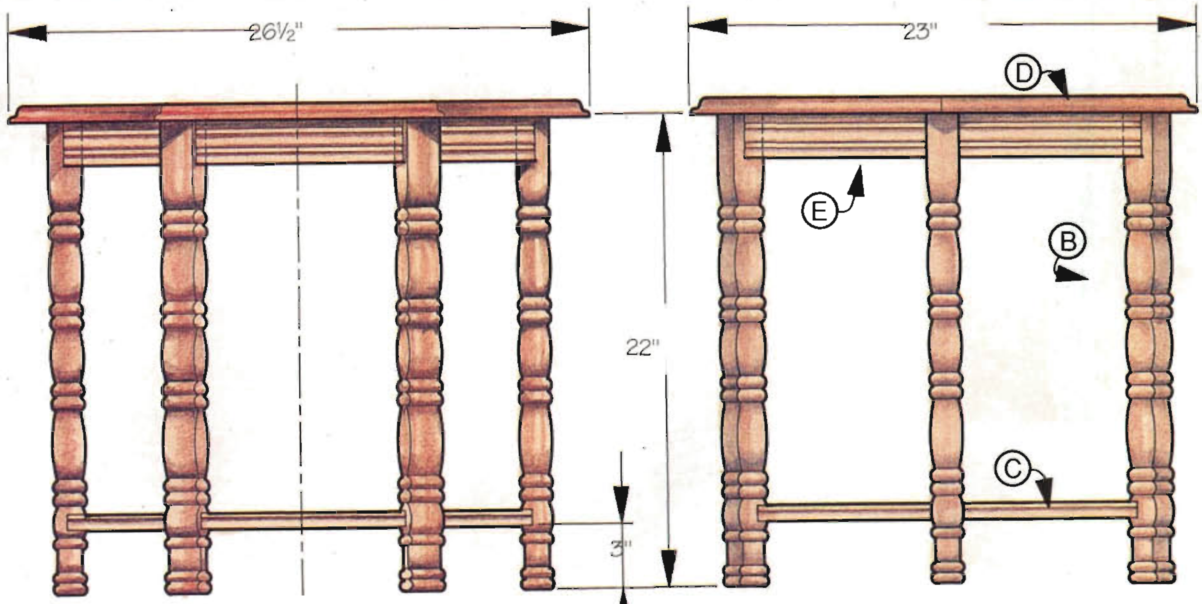
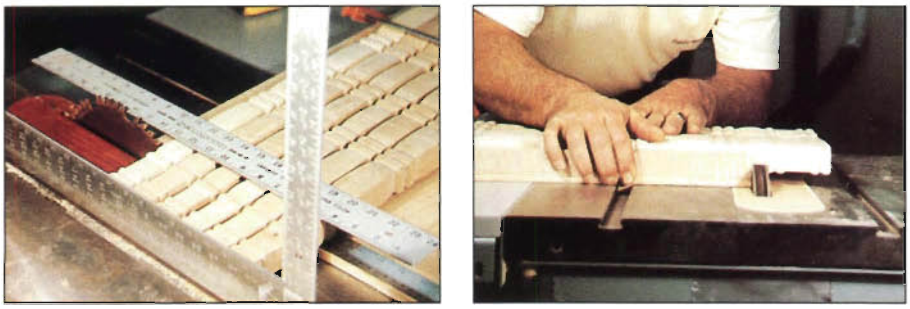
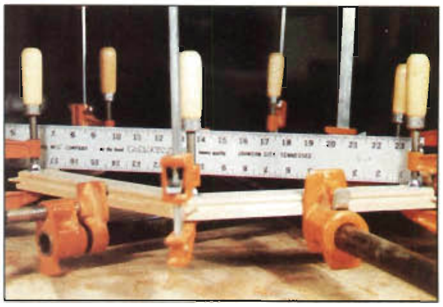


**Figure 4. Side Views**



*Square the ends of the legs, position them on the panel cutter for the dado, and clamp them. Shim if needed. Remove the panel cutter and legs, and change the saw blades. Finally, accurately align and cut the dado.*



*This procedure is tedious and must be completed before the glue sets up. Note the biscuits protruding from the joints.*

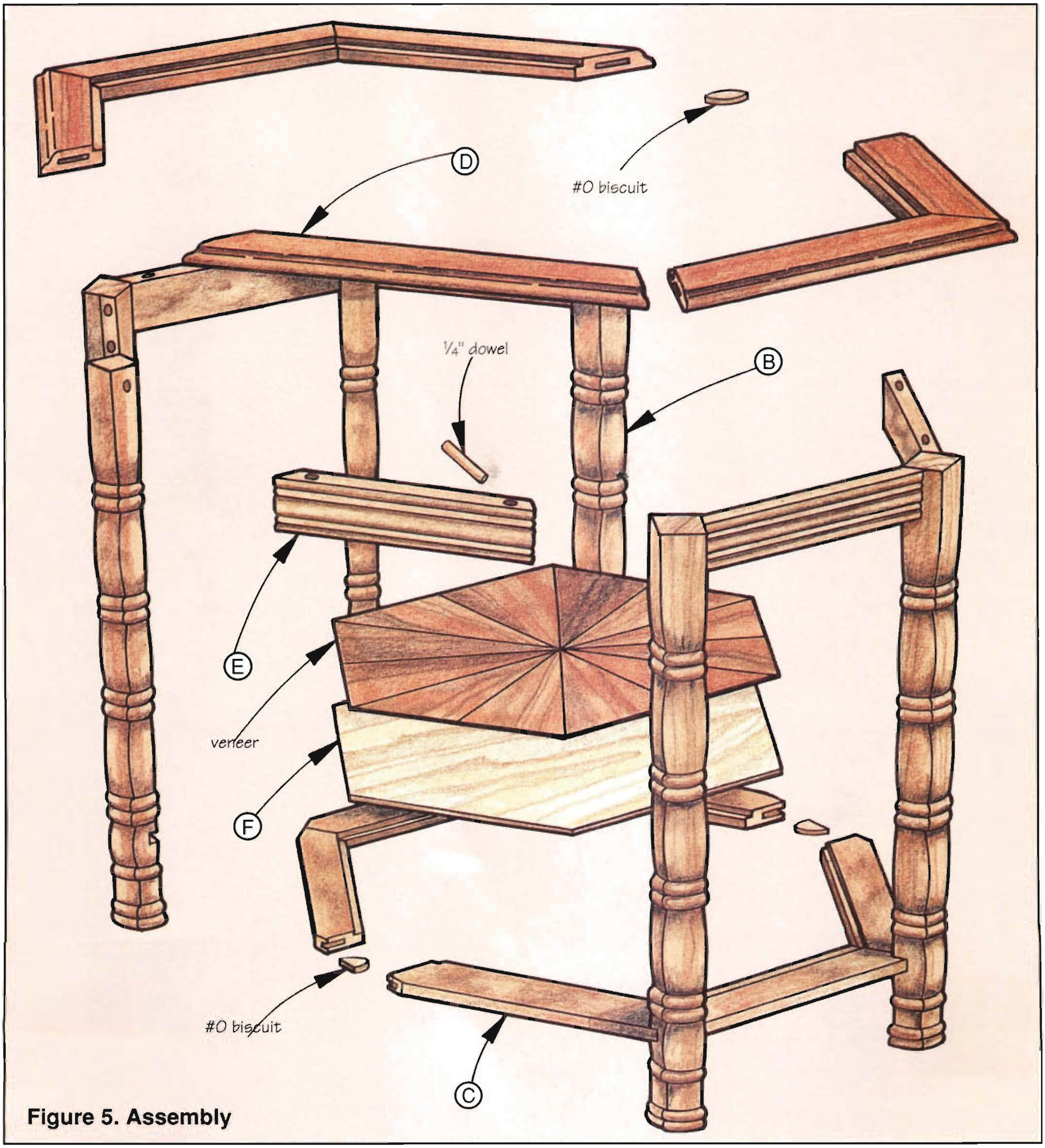


**Figure 5. Assembly**

each end of each leg all the way through as shown in Figure 2. Use the same measurement on the second hole, rotating the leg 90°. The holes must be centered and perpendicular to the leg.

After all 24 holes are drilled, position Leg 1 on the mandrel so that the sides of the leg are ⅛" from each edge of the flat and equidistant from the ends. Clamp it in place with two clamps and set it up on the drill press table. Carefully slide the bit through the hole in the leg and drill all the way though the mandrel. Repeat this process with Legs 2 and 3.

With Leg 4 in place on the mandrel, insert a ⅜" X 7" carriage bolt into each end of the leg and through the mandrel. Turn the whole thing over and slide Leg 1 over the carriage bolts. Drop a flat washer on each bolt and spin on a nut. Tighten the nuts until the square section of the bolt is pulled into the wood and the head is flush to the leg. Spin on another nut and jam it against the first. (Take a second to think about the chain of events that would occur with a fast–spinning lathe following the loss of a nut.) Continue with leg pairs 2 (bolt head side) and 5, and 6 and 3. When this twenty–pound chunk is all bolted together, stand it on end. If you assembled the legs to the mandrel correctly, the bolt heads and nuts should alternate as you proceed around the mandrel (photo, page 56 top). This will help balance this rather large mass. Drive the tail stock center into the far end to locate its position; then return it to the lathe. Attach the faceplate to the other end; be sure to keep it exactly in the center.

**Hexagonal End Table**

**Cutting List**

| Qty | Part | Finished Size | | | Piece |
|---|---|---|---|---|---|
| | | T | W | L | |
| 1 | A | •3⅛" | •3⅝" | 36" | mandrel |
| 6 | B | 1½" | 1½" | •33" | legs |
| 6 | C | ¾" | 2⅛" | *12" | shelf frame |
| 6 | D | ¾" | 2⅞" | *14" | top frame |
| 6 | E | ¾" | 2" | *11" | aprons |
| 1 | F | ¼" | •18" | •18" | shelf |

**Supplies**

| | |
|---|---|
| 6 | ⅜" X 7" carriage bolts and washers |
| 12 | nuts |
| 1 | 5" X 40" veneer |
| 1 | ¼" glass cut to fit |

*miter to finished lengths shown in Figure 3

•rough size

A word of caution—beware of the protruding nuts and threaded bolts; they're just spinning around waiting to grab a tool or a fleshy knuckle. Double–check the position of the tool rest in reference to the bolts on Legs 6 and 3 (the bolts closest to the center of the leg). Hand spin the mandrel through 360° to make certain there is no interference.

Position the tool rest so that it just touches an edge of one of the legs. Rotate the mandrel to the next leg. If there is a space or the leg runs into the tool rest, note the leg number and direction. When all six legs have been checked, shim up the ones that are lower so that all six touch the tool rest as the mandrel is turned. Move the tool rest out of the way, remove the drive belt and spin the piece by hand, just a couple of revolutions, to check the balance. If one leg seems to repeatedly settle on the low side, drive a small nail into the end of the leg on the opposite side of the mandrel. Remember to pull it out before you cut the legs to finished length.

Set the lathe speed to 850-900 rpm, check the position of the tool rest, rotate the piece 360° by hand, and turn it on. Be prepared to shut the power off in the event that all is not well. Take note of the shiny blur of the knuckle busters. Rough out the first side in approximation to the leg profile template provided in the PullOut™ Plans section (copy the pattern onto a piece of hardboard and cut it out). Remember, the leg profile is square for the top three inches of the leg. With the lathe stopped, check the template against the leg and mark the high points boldly with a pencil. Turn the lathe back on and remove all the pencil marks. Stop the lathe and repeat the process until satisfied with the results.

There may seem to be an extraordinary amount of chipping at the edges of the legs. Push on. When all four sides of each leg have finished their turn at the gouge, you'll have surprisingly few chips to repair. I repaired only two small spots. Note also that the more precise your set up, the less of a carving project you'll have when you remove the legs from the mandrel.

Turn up the speed to about 1500 rpm, and sand with coarse and then finer grits. Unlike a center–turned piece, you can't palm the paper and press it against the piece until it gets too hot—the legs will beat your hand to death. The best method is to hold one end of a folded piece of sandpaper in your right hand (if right–handed), and with your left hand holding the other end, bring it up under the work.

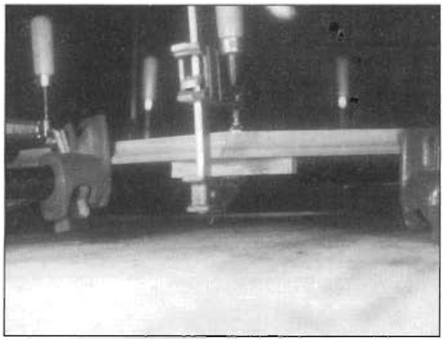
When satisfied with the sanding process, unbolt one pair of legs and rotate each piece 90° so that the just–turned side is facing forward. Insert the bolts and rotate the mandrel 180°. Slide the second leg down over the bolts and reattach the washer and nuts. Repeat for the other two pairs of legs. Re–shim and re–balance.

Turn the new surfaces to the point of just removing the flat. Transfer the low spots from one of the legs just finished. Use a square to mark the new work surface with a bold pencil line. Check the position of the tool rest again and turn it on. Place your pencil on the tool rest and inch in on one of the lines to mark all six legs. This will make it easier to see. Repeat the steps above for all four sides of each leg. When finished, remove the legs, and do any filling, filing or finish sanding needed.

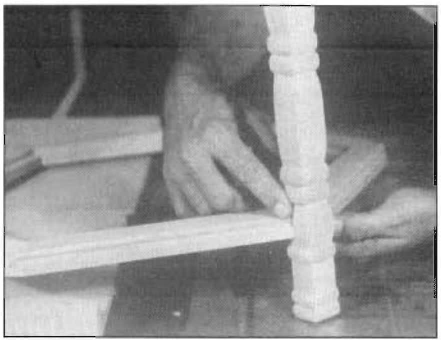
Clamp all six legs together and to your table saw's panel cutter, and trim off the bottoms. Unclamp the legs and reposition them for the shelf dado. A small shim may be necessary under the turned part of the leg so the dado is perpendicular to the centerline of the leg; I used a thin steel rule (photos opposite page). Install the dado blade (¾" thickness) and adjust the height to cut half way into the legs; then make the cut. Reinstall your single saw blade, reposition all six legs, and trim them to a length of 22" (there should be roughly 3" of flat, square at the tops). Shim if necessary.

Shape the moulded edges of the shelf frame (C) (maple), top frame (D) (cherry), and apron (E) (maple) as single, long strips before trimming them to the dimensions given in the Cutting List. The material for the shelf frame is 2⅛" X 72", the top frame 2⅞" X 84" and the apron 2" X 62". Cut a ½" wide X 9/16" deep rabbet on the top surface of the shelf and top material. This depth setting allows the glass top to be level or marginally below the top after sanding and accounts for the thickness of the veneer that will be added to the ¼" plywood shelf. Plane the shelf frame material (on the bottom, not on the side with the rabbet) to get a snug slip fit into the dado in the legs.

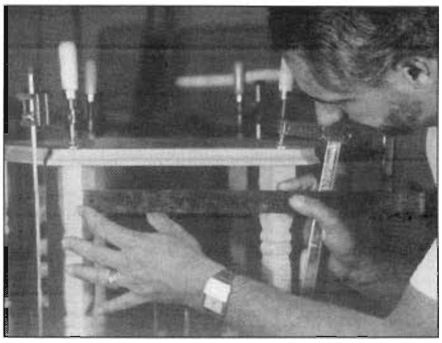
Trim the stock for the shelf frame, top



*Provide a flat undersurface at the joints for a brace. A slight tap on the end will break the brace loose when the glue has dried, or insert a piece of wax paper in between.*

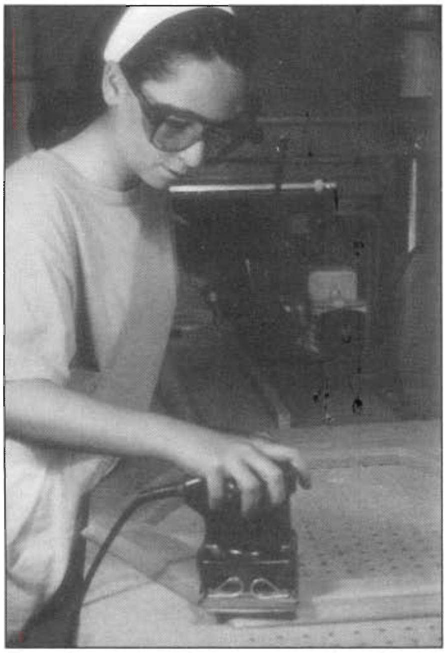


*Place the hexagon on the panel cutter with a flat edge against the front fence, remove the biscuit and a little of the tip, test fit in the leg dado and repeat as needed.*



*Measure the distance between each leg pair—a $^1/_{16}$" fudge factor is acceptable and visually undetectable. This measurement, minus $^1/_8$", gives the apron length.*

frame and apron to the rough dimensions given in the Cutting List. Set the miter saw to 30° and cut that end on the shelf and top frames. Set the saw in the other direction, measure and set a stop block to the exact dimension of the shelf frame given in Figure 3, and make the second cut. Reset the stop block to the top frame dimension and make that second cut, but don't cut the apron at this time.



*If you have a willing helper, put her to work safely.*

Biscuit–join the ends of the pieces for the shelf and top frames with #0 biscuits. You may have to clamp the biscuit cutter to the piece if the anti–slip pins don't engage the wood. On the shelf frame, the biscuits will have to protrude on the outside edge, but you'll trim them off and the legs will cover the biscuit.

Glue and gently clamp the hexagonal sections together. Measure each end of the parallel pairs (see the ruler in the photo, page 58 top right) and adjust the clamps to get all the distances as close as possible to each other. It helps to position a stiffener piece under each joint when clamping (photo above left).

Trim the protruding biscuits and edges of the shelf frame so that the cut is the same length as the width of the leg at the dado (photo above center). Position, glue, and clamp all six legs to the shelf frame. Position the top frame on the ends of the legs in such a way that the interior angles are centered and flush with the back flat edge of each leg. Adjust as needed and clamp it in place.

Measure the distance between the front outside edges of the legs (they should all be the same), subtract $^1/_8$", and use this dimension to miter the apron pieces. Check the fit and end glue them to the legs only (they can be clamped to the top). When the glue has dried, remove the clamps and give the top to your helper to sand and fill.

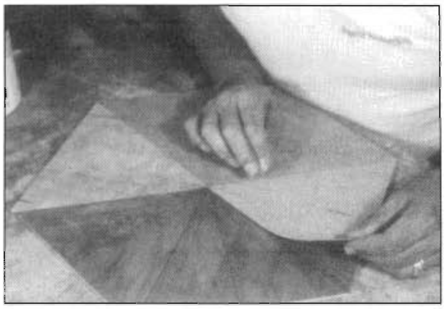
Cut a $^1/_4$" plywood shelf (F) to fit snugly into the rabbet in the shelf frame. Draw lines to connect the corners, and cut some veneer (cherry) into pieces just a little longer than the distance from the center line to the edge. Cut them in half diagonally (photo, below left), position them in place, and trim all but one (11 of 12) to fit on the lines. Apply contact cement to the ply and veneer (except for that one piece) as per directions, and when ready carefully stick them down. Put the last one in position; mark, cut , and recheck the fit. Then apply the contact cement and stick it down. Glue the completed shelf into the shelf frame rabbet.

Drill twelve angled $^1/_4$" holes through the top of the aprons into the legs for dowels. Glue the dowels in place and trim them flush. Turn the table upside–down and drill and countersink a hole in the center of each apron for the screws to hold the top in place. Attach the top.

Finish at your discretion, but here's what I did. Call, or better yet, visit your local industrial chemical supply house and pick up potassium hydroxide (KOH). Also make sure you ask for and receive the safety sheet on this very caustic chemical; read it. Make sure you're wearing safety goggles, an apron and vinyl or latex gloves. Mix about $^1/_2$ teaspoon of the KOH with $^3/_4$ cup distilled water by slowly adding the KOH to the water, stirring continuously. A lot of heat is generated by this reaction if not done slowly. Paint or wipe the KOH solution directly on the wood; the cherry turns a beautiful red–orange. Other woods will turn different colors; you may want to experiment. When the wood is the color you want, wipe with a damp cloth or sponge. Let the piece dry and then apply Briwax's Antique Mahogany.

Susanna Cook

*Pay attention to the grain as you cut and lay out the veneer. A sharp razor will help prevent tear–out at the end of the cut.*



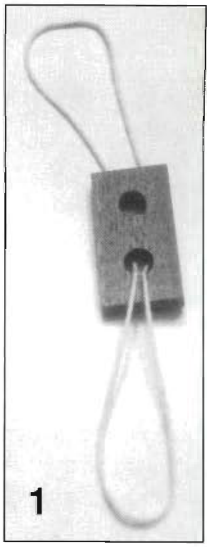
*Once the glued surfaces touch they're very difficult to reposition. Cut the last piece to size only after the others are glued in place.*

# A Simple String Puzzle

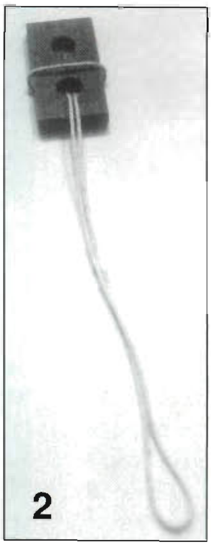
**by Hugh Foster**

You can make a lot of these simple stocking–stuffers quickly by setting up a fence with two stop blocks on your drill press. Position the stops to center 3⁄8" holes at 9⁄16" from the ends of 1⁄4" X 1" X 2" blocks. You'll need two blocks per puzzle and an 18" length of cord tied in a loop with its loose ends trimmed off.

The object of the puzzle is to untie the two blocks; then tie them back together so they look like they do in the silhouetted photo. Before you can give it to someone to solve, though, you have to tie them together yourself. The photos below show you how. PW


1

*Push the string through one hole, and wrap it around the block.*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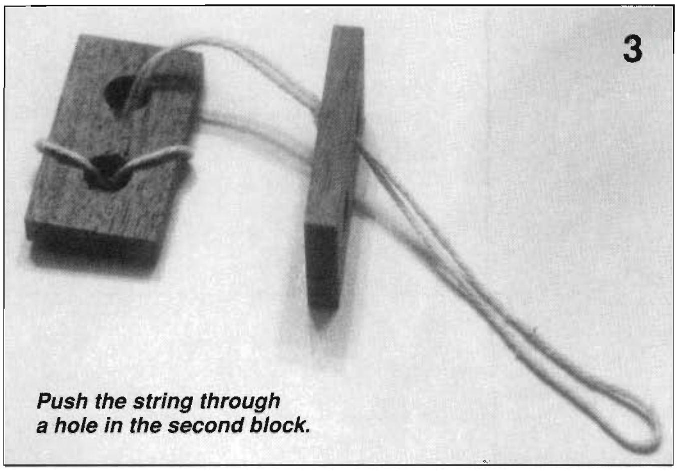
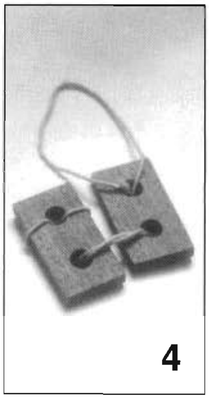
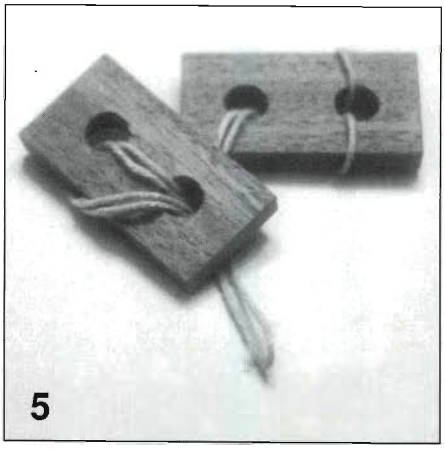

3

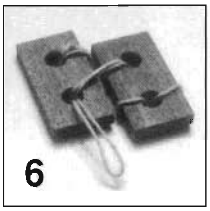
*Push the string through a hole in the second block.*


4

*Then thread it back through the other hole in the second block.*

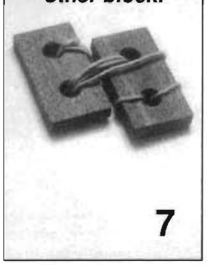

5

*Push the loop through the other side of the hole it went through in step three.*


6

*This is what step five looks like on the other side.*

*Pull through enough string so that it will slip over the other block.*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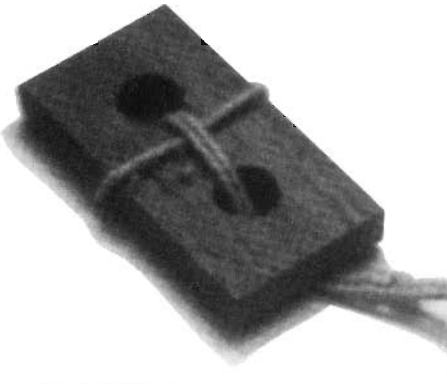
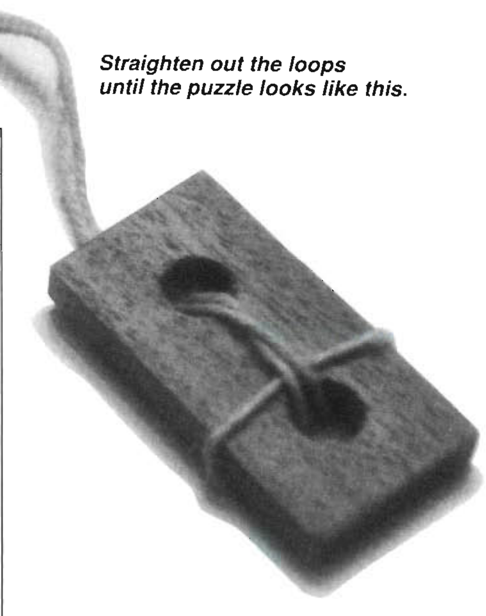
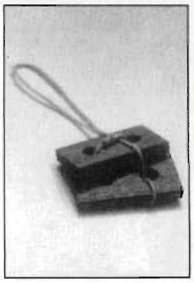


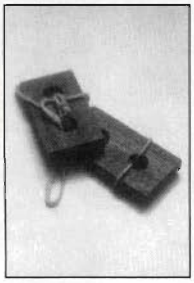


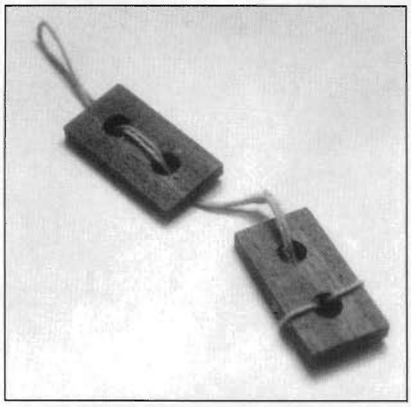
*Straighten out the loops until the puzzle looks like this.*

## Untying the Puzzle

*To untie the puzzle, simply reverse the procedure. Grasp one of the loops that wraps around a block and pull through enough slack to slip the loop off the block.*







# Tool Box

## by Jeff Greef

This tool box is based on a design used by woodworkers over the centuries, but it makes use of a modern innovation that wasn't available until recently—plywood. Older tool boxes were made of solid planks joined with dovetails or nails. This can make a very sturdy box, but is invariably heavy. Over time, it may suffer the problems inherent with wide solid stock—splitting and warping due to moisture variation.

Plywood is light, strong, and not noticeably affected by normal changes in humidity. The most difficult problem with plywood is joining it. Fancy joinery like dovetails is not feasible on thinner plywood. A large box joined with dovetails on ¼" stock would probably break the joints when stressed. My solution was to use corner blocks where plywood joins plywood, and screws to fasten the blocks to the ply. The corner blocks only need to be thick enough to hold the screws. The structural integrity of the box comes from the strength of the plywood rather than the strength of the wooden frames.

*__Jeff Greef__ works wood and writes about it in Soquel, California.*

**Tool Box Cutting List**

| | | Finished Size | | | |
|---|---|---|---|---|---|
| Qty | Part | T | W | L | Piece |
| 4 | A | ¾" | ¾" | 12½" | end frame rails |
| 2 | B | ¾" | ¾" | 38" | top rails |
| 2 | C | ¾" | ¾" | 36" | bottom rails |
| 4 | D | ¾" | ¾" | 23" | end frame stiles |
| 2 | E | ¾" | ¾" | 23" | top frame stiles |
| 2 | F | ¾" | ¾" | 22½" | bottom frame stiles |
| 2 | G | ¾" | 4" | 23" | handle plates |
| 2 | H | ¾" | ¾" | 23" | top frame mullions |
| 2 | I | ¾" | ¾" | 22½" | bottom frame mullions |
| 2 | J | ¼" | 22½" | 23" | end panels |
| 3 | K | ¼" | 23" | 38" | front/back/top |
| 1 | L | ¼" | 22½" | 36" | bottom panel |
| 3 | M | ¼" | 18" | 22⅜" | tray bottom |
| 2 | N | ½" | 1½" | 21⅞" | tray sides |
| 2 | O | ½" | 1⅞" | 21⅞" | tray sides |
| 2 | P | ½" | 3⅝" | 21⅞" | tray sides |
| 2 | Q | ½" | 1½" | 18" | tray ends |
| 2 | R | ½" | 1⅞" | 18" | tray ends |
| 2 | S | ½" | 3⅝" | 18" | tray ends |
| 6 | T | ¾" | ¾" | 36" | runners |
| 2 | U | ¾" | 2" | 36" | front box rail |
| 2 | V | ¾" | 2" | 21" | side box rail |

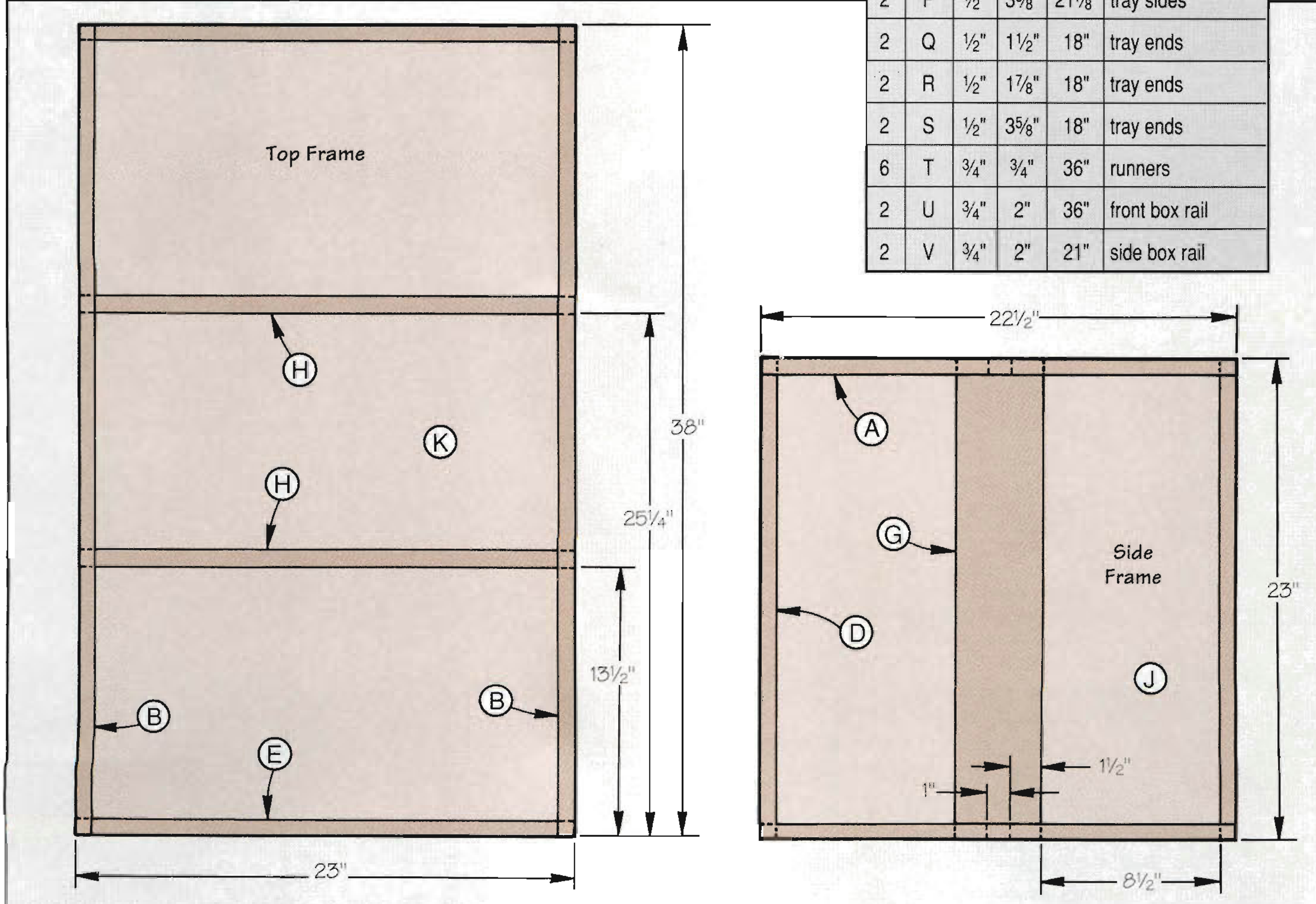
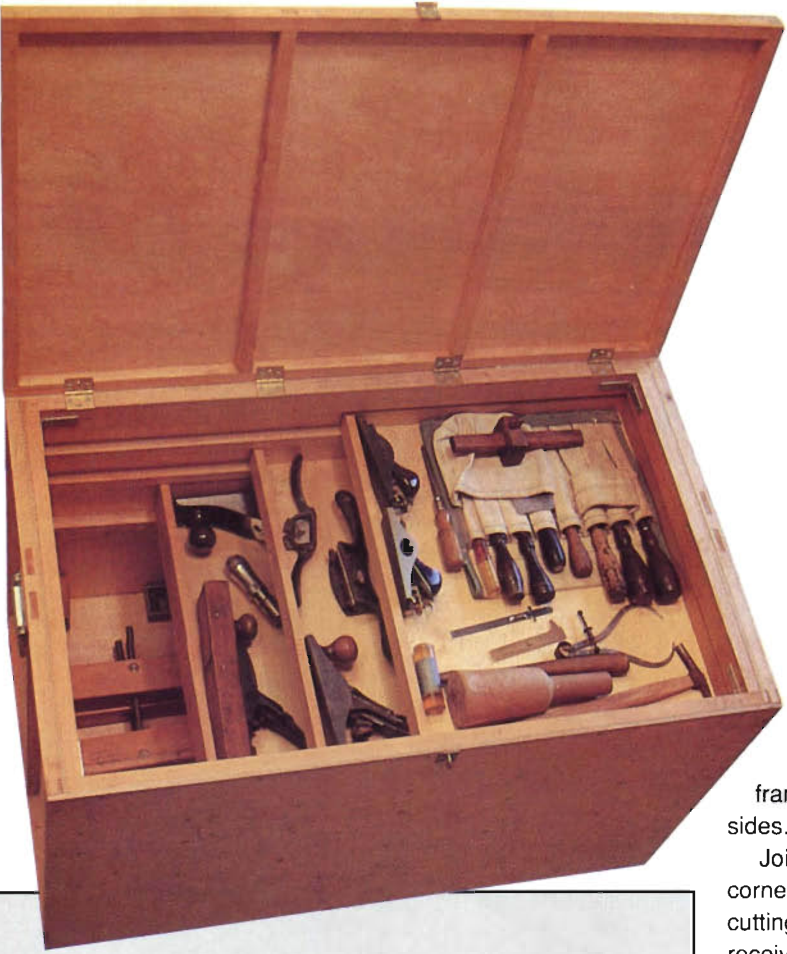
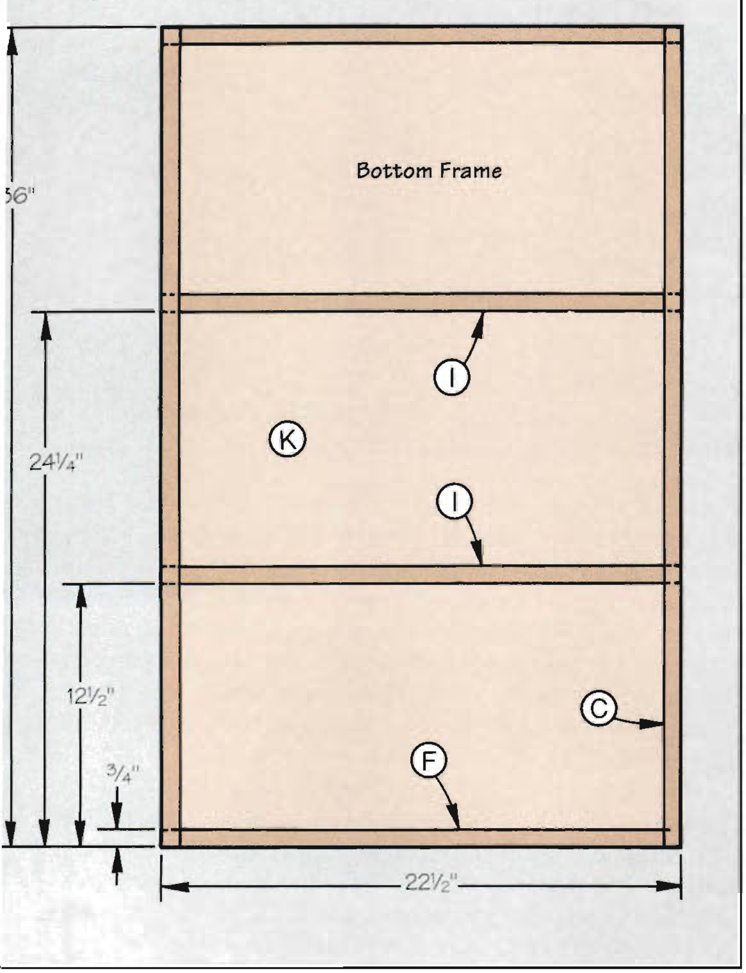


Figure 1. Top, Side and Bottom Frames

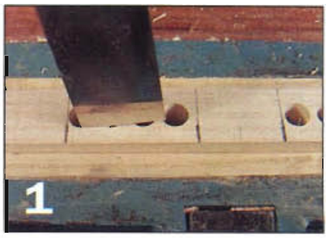




Begin by making the four frames that will function as the corner blocks for joining the plywood. There are two identical frames for the box ends, and one frame each for the top and the bottom. The bottom frame is smaller than the top because it fits in between the sides. Cut the stock to the dimensions given in the Cutting List.

Join the frames with open mortise and tenon joints at the corners, and through joints for the middle members. Begin by cutting the through mortises in the eight rails (A, B and C) that receive them (Figures 1 and 2). If you have a mortising chisel for your drill press, use it. If you don't, bore a series of holes at each mortise location and chisel out the waste (photos 1 and 2). Be careful not to cut all the way through; once you are about halfway through, flip the part and repeat the procedure from the other side.

Next cut the tenons on the ends of the stiles (D, E and F), handle plates (G) and mullions (H and I). Adjust their thickness to match the mortises they will fit into. All tenons are ¾" long. You can cut tenons on the table saw with a tenoning jig (see Issue #62 for plans for the tenoning jig shown in photo 3) or any number of other methods. Once these are cut, make the open mortises to match these tenons. The reason for making the mortises and



***If you don't have a mortising chisel, drill out the waste and square up the holes by hand.***

author

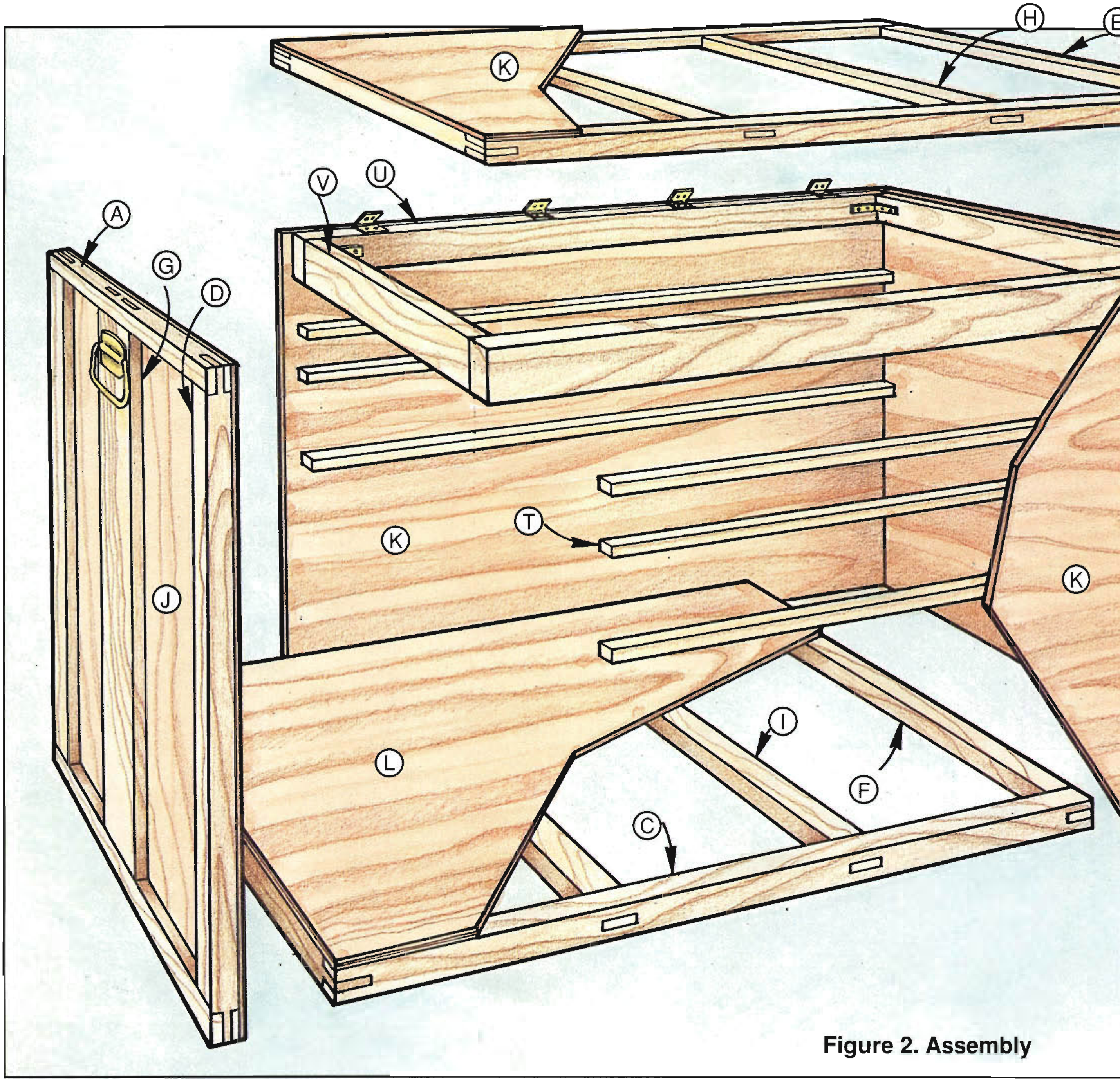


Figure 2. Assembly

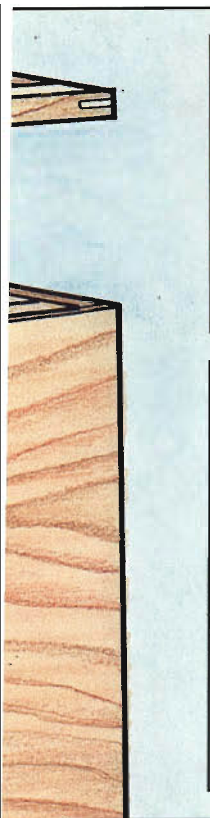
tenons in this order is that the through mortises are the most difficult to adjust for thickness, whereas the tenons and open mortises are far easier. Use the tenoning jig to cut these slots, or stand them on end and run them through the table saw against a high auxiliary fence. Use a solid support block behind the tenon so you can hold it square and steady as it passes through the blade. Make the mortises undersize; then gradually adjust the cut to enlarge them until they fit the tenons. Adjust the mortise width by moving the saw fence.

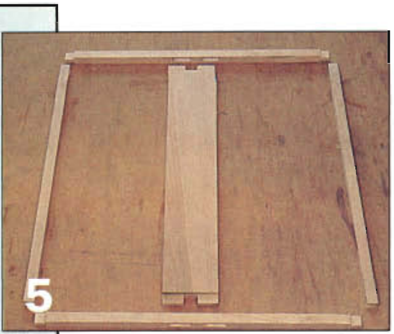
Before assembling the side frames, cut the wide tenon on the handle plates (G) into two tenons to fit the two mortises that were cut in the rails. It is always best to reduce the amount of cross-grain gluing in any joint. Mark the wide tenon and make two saw cuts (photo 4); then chisel out the waste.

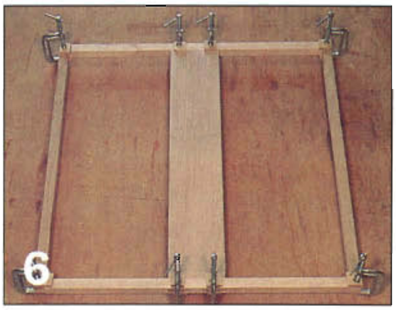
Your parts should now appear as in photo 5. Test fit each frame to be sure that all the joints go together well; then glue and clamp as in photo 6. Check to be certain that the frames are square. The clamp pressure needn't be excessive, but should be enough to be certain that all the joints close.

The next step is to cut out the plywood panels (J,K and L) and tray bottoms (M). For this you'll need two 4 X 8 sheets of ¼" ply, or one 4 X 8 sheet and one 5 x 5 sheet. (Some hardwood plywood comes in 5 X 5 sheets, which will yield less waste.) I used birch ply for my box because it's tough. If you use thicker plywood, you'll need to adjust some of the dimensions.

Cut the tray sides (N, O and P) and ends (Q, R and S) out of ½" stock. Cut ¼" X ½" rabbets on the ends of the tray ends. Glue and screw (or nail) the trays together, then attach the plywood bottoms. The trays ride on runners (T) that are fixed to the front and back panels (K). Carefully measure to locate these runners as shown in Figure 4, clamp them in place, and screw them on from the outside surface of the piece.







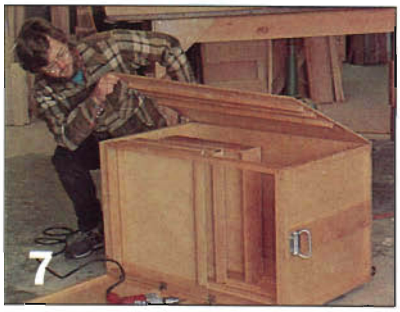
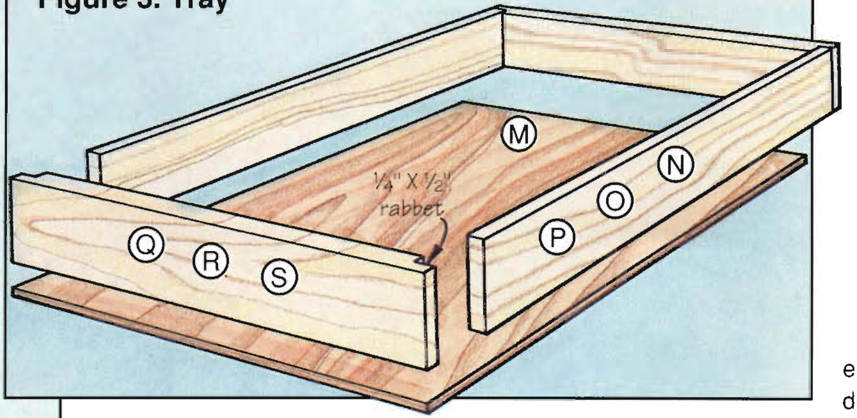


***Photo 5 shows the frame pieces before assembly; the clamping set–up appears in the next shot. In photo 7 the author has the chest on its back, trays in place, while he fits the front.***

**Figure 3. Tray**



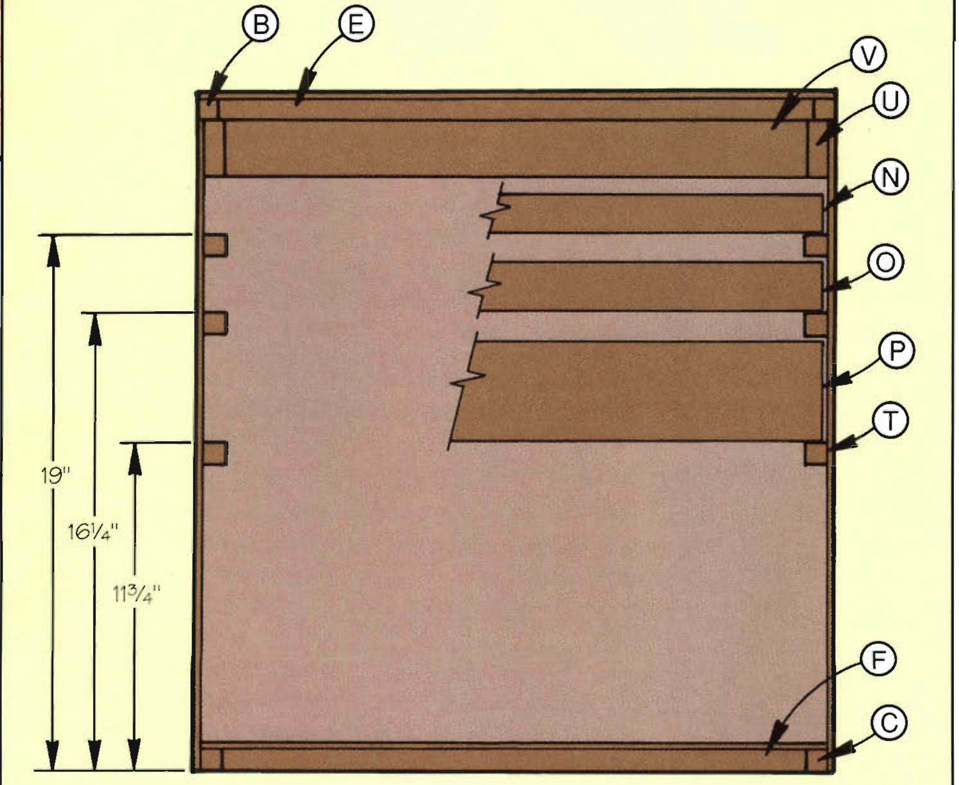


**Figure 4. Tool Box Cross–Section**

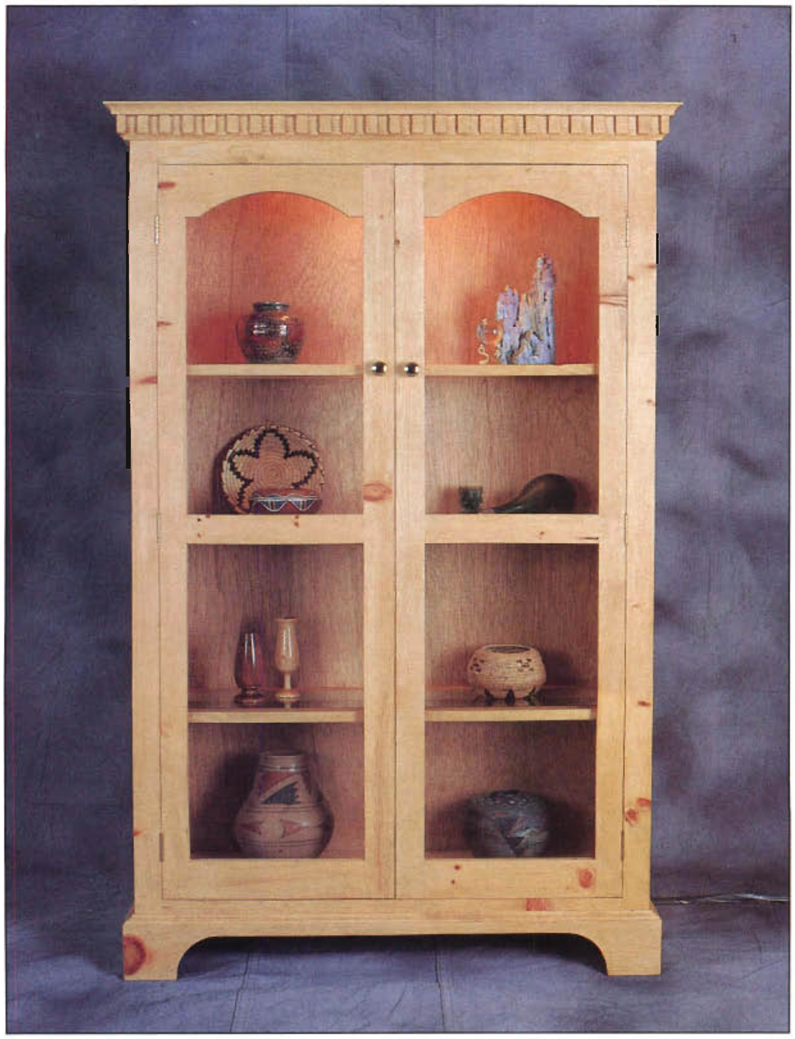
Bob Chapla and Ginny Pruitt

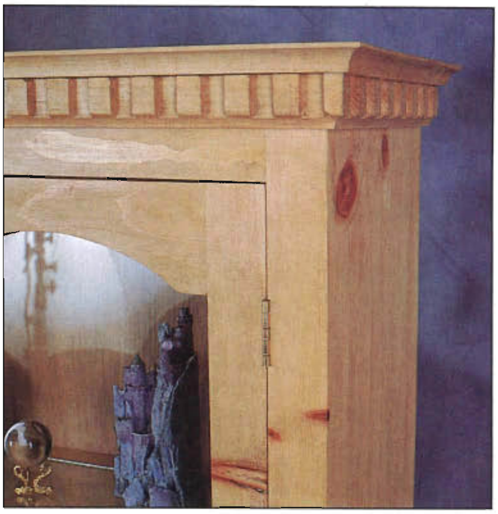
Begin assembling the box by screwing the end, bottom and top panels to their frames using ¾" screws. You may find that the frames don't line up perfectly with the edges of the plywood, but they are relatively light and can be manipulated slightly to pull the edges into line. Locate the screws every 4" to 6". Next attach the ends to the bottom with 1½" screws driven through the end frame and ply into the bottom frame. Once this is completed, you can screw the back panel to the end and bottom frames. Be sure the runners for the trays are toward the top of the box. Place the box on its back and put the trays in place alongside their runners. Now lower the front down into position (photo 7), fitting the trays between the runners on the inside of the front. Screw down the front.

Set the box upright and see that the trays slide freely. Now attach the box rails (U and V) along the inner rim of the box with screws driven from the outside, and fasten the four support angle irons at each of the corners. I used four hinges to secure the top to the back, and found some standard box handles to attach to the handle plates. Don't skimp on the casters for the bottom—they'll carry a fair amount of weight. If you want to lock your box, or just secure it shut, install a latch for a padlock or a wooden wedge.

Carpenters who take their boxes on the job usually build fixtures on the inside of the top to hold their saws. Design custom holders to fit your saws if you want to add this touch.

Rub a candle on the runners to keep the trays moving freely. A coat or two of satin polyurethane will protect the outside, but I left the inside unfinished so the fresh smell of birch ply would persist. It's been a few years, but it's still there. PW





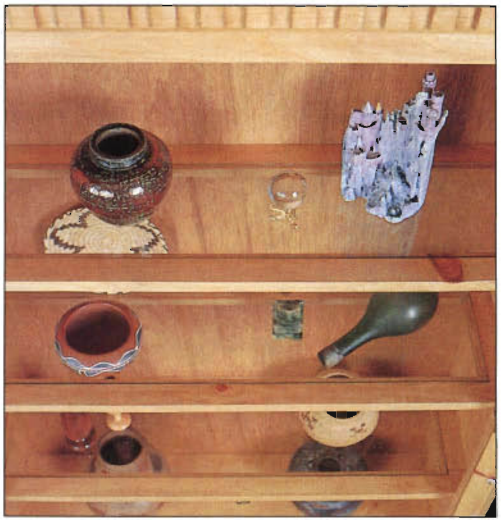
# Curio Cabinet

### by H. Wesley Phillips

When my sister informed me of her coming marriage, it was a good opportunity to build a project she'd wanted for some time. She collects music boxes but has little space to display them. So I decided to build a display case for her wedding present.

It's made of pine with framed glass shelves and doors. The shelves are set at fixed heights to add strength to the overall design. They can be spaced differently for your specific needs, but if you do this, first consider what the overall appearance will be. Adjustable shelves may weaken the design.

The first step is to select the wood. Your router will be pretty busy with this project so you may not want white oak. I chose #2 or "D" select yellow pine. When you purchase your lumber, try to match color and grain. Small, tight knots are acceptable. I cut and labeled all the pieces according to the Cutting List before assembly. You may want to make the door pieces after assembling the case.



Elizabeth Vanderliet

Mark the positions of the dadoes on the two side panels (A) for the bottom (B) and the shelves, and the rabbet for the top support as shown in Figures 1 and 2. Butt the panels to each other and use a long straightedge or T-square to measure and mark each piece. The dadoes are ¾" wide and ¼" deep; cut them with a ¾" straight bit in your router. I used the guide shown in the photo on the next page. Begin the cut from the rear and stop short of the front edge. Finish from the front to prevent tearout. Lightly sand to remove any fuzz, but don't widen the slot. Repeat the process for the other side panel. Next, cut away the waste at the bottoms of each side as shown in Figure 1. Cut a ¼" wide X ⅜" deep rabbet on the inside rear of each panel to accept the back (C).

Make the three shelf support frames and the top support frame next. The shelf supports form a frame for the ⅛" glass shelves. The top support adds rigidity to the case and pro-

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***H. Wesley Phillips** is an electronics engineer and spare–time woodworker from Greer, SC.*

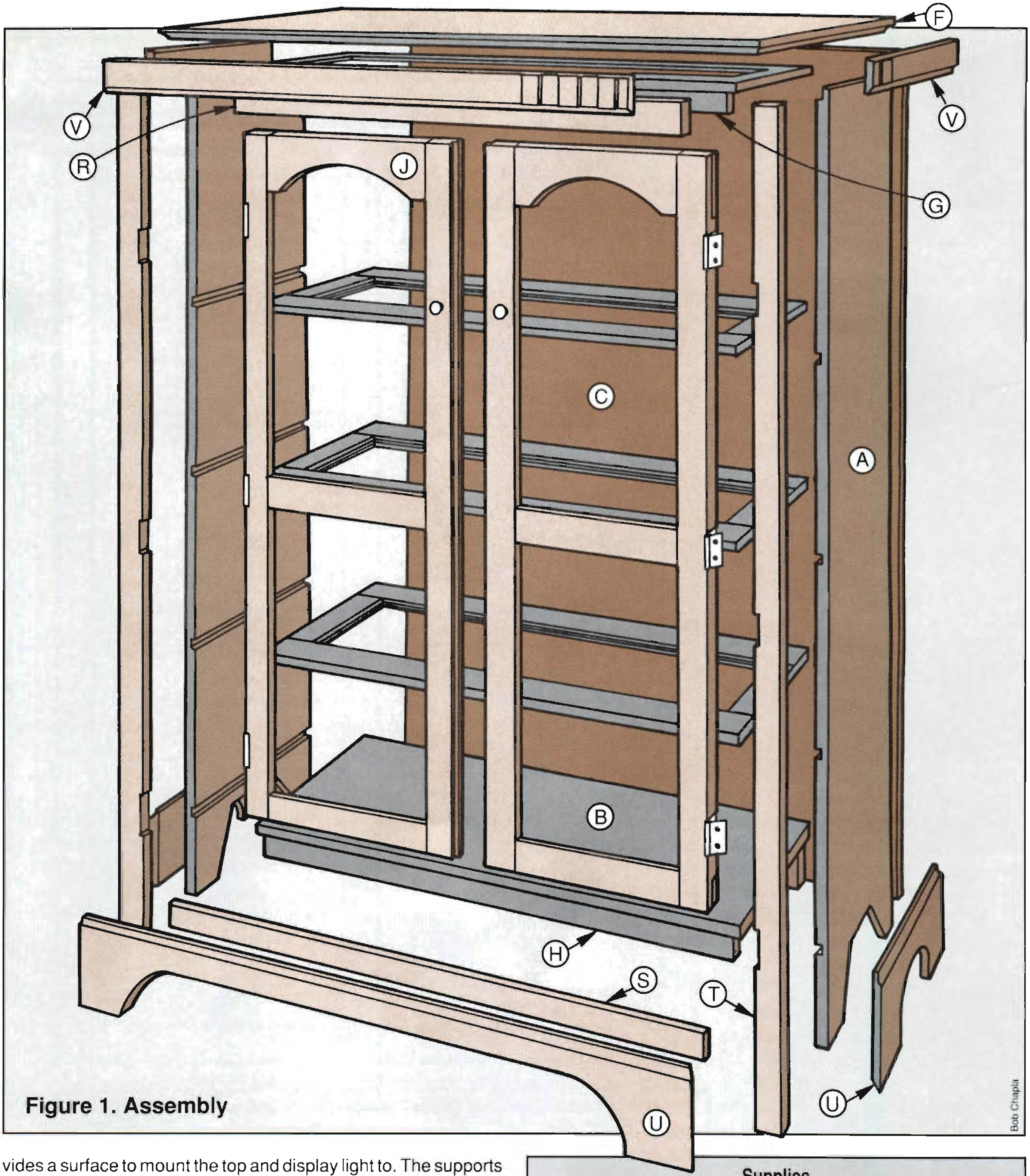
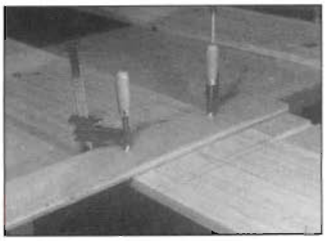


Figure 1. Assembly

vides a surface to mount the top and display light to. The supports are constructed with half lap joints. Set up the dado blade in the table saw to cut away half the thickness (about ⅜") of the stock; set the fence with a stop block at 2" from the outside of the blade. The block prevents the work from binding with the blade. Make the cuts on all the supports (D and E). Test fit each joint, then glue and nail the underside with ½" brads while checking for square.

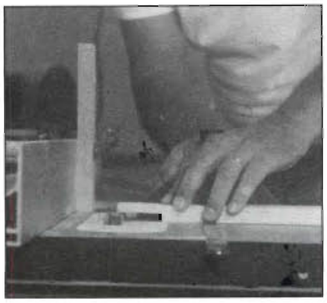
After the glue dries, cut the rabbet for the glass shelves using a ¼" rabbeting bit in your router. Set the bit to depth to slightly over ⅛" to insure the glass does not protrude above the support. Square the corners with a chisel and sand them for final finish now, before assembly.

| Supplies | |
|---|---|
| 6 | 2" brass hinges |
| 2 | 1" diameter door knobs |
| 32 | glass clips |
| 3 | ⅛" X 6⅜" X 31⅜" glass shelves |
| 2 | ⅛" X 12⅝" X 22¾" glass door tops |
| 2 | ⅛" X 12⅝" X 23⅞" glass door bottoms |
| 1 | display light |

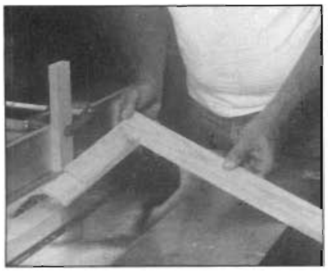


*Make a guide like the one shown here to rout the dadoes in the side panels.*

*Cut the waste from the bottoms of the side panels with a saber saw.*



*To cut half lap joints for the support frames, set the dado blades ⅜" high and the fence (plus spacer block) 2" from the far side of the blade.*



*Test fit each half lap joint; then glue and nail the underside with ½" brads while checking for square.*

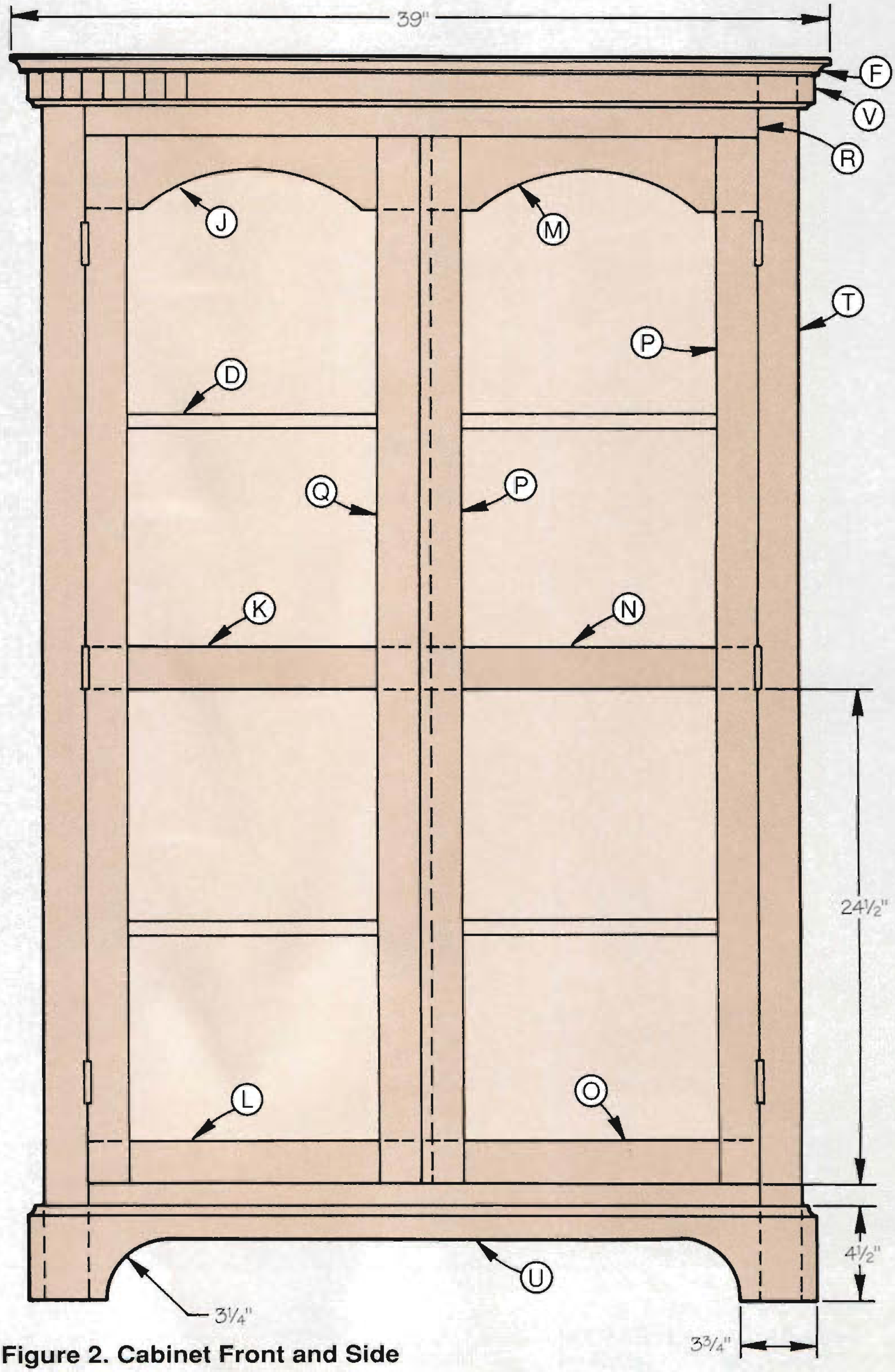
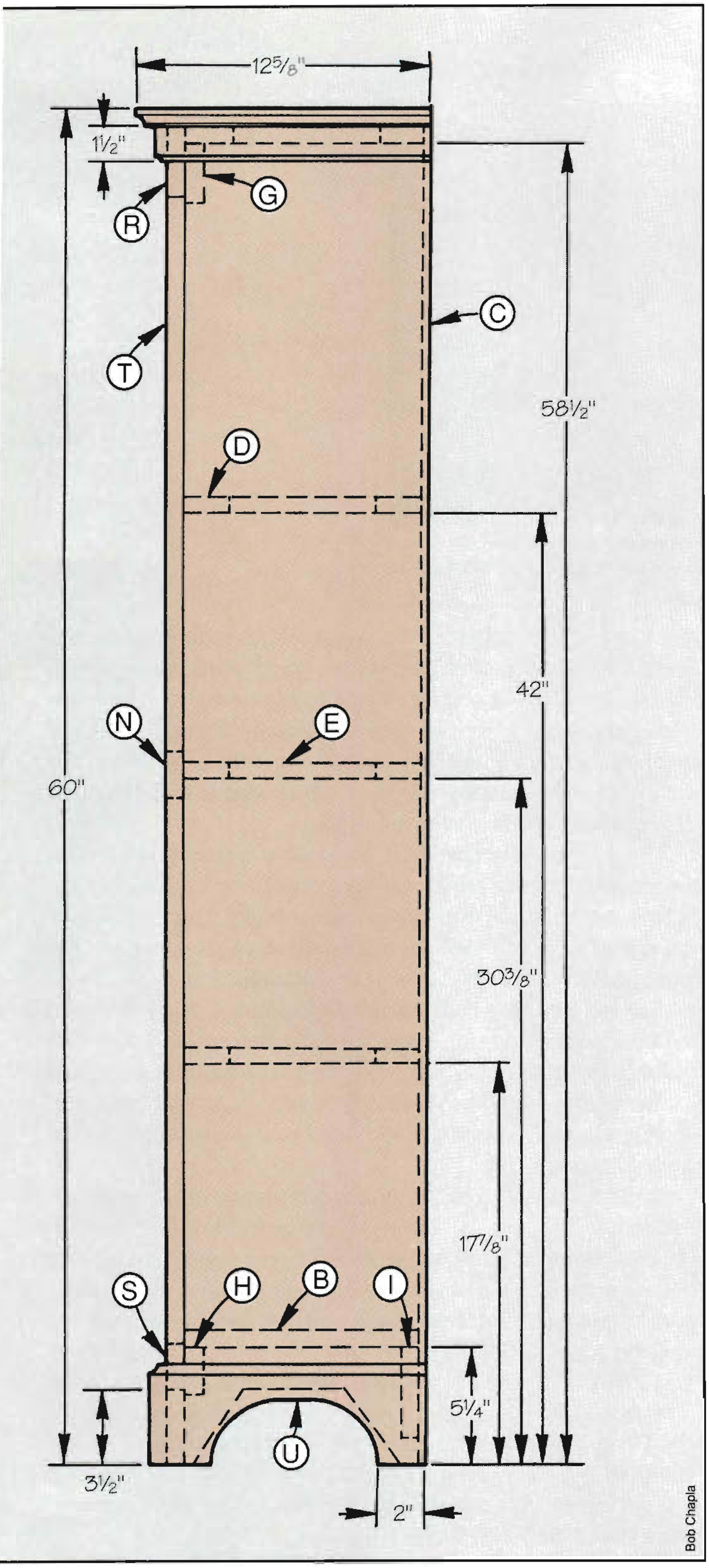


**Figure 2. Cabinet Front and Side**

Next, drill six oblong holes in the top support frame for the screws that secure the top (F). These oblong holes should run in the direction that crosses the grain of the top to allow it to expand and contract with changes in humidity. Sand the top support frame and the inside of the side panels before continuing.

The sides, frames, and bottom can now be assembled. Mark the center line of each dado on the outside of both side panels and lay one panel on the bench with the dadoes facing up. Apply glue to the bottom dado and insert the bottom. Make sure the back edge is flush with the rabbet for the back.

Repeat the process for the three shelf support frames. Use a wooden mallet to help persuade the supports into the dadoes if needed. If there's any discrepancy in width, trim the shelves from the front when the glue is dry. Remember to face the rabbets for the glass shelves up. Apply glue to all the dadoes on the other side panel and set it on top of the supports and shelf. Glue and nail the

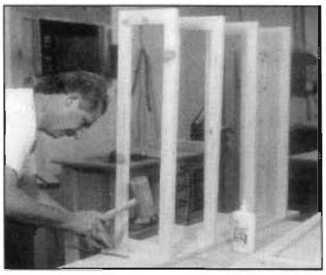


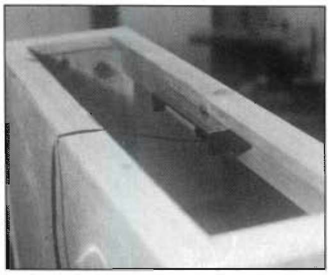
top support in place. Clamp lightly where needed; slide in the back and nail it in place without glue. You can make life a little easier by staining the back before installing it. Make sure the top of the back is even with the top of the top support frame. If your plywood back is square, the cabinet should also be square. If you don't trust that, measure the opposite diagonals and adjust the clamps until the measurements are equal. Nail the frames and the bottom in place along the dado centerline.

### Curio Cabinet Cutting List

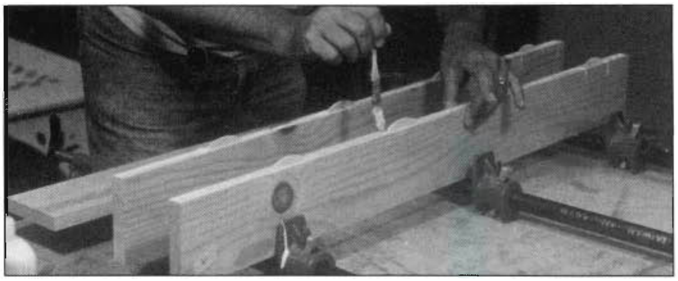
| | | Finished Size | | | |
|---|---|---|---|---|---|
| **Qty** | **Part** | **T** | **W** | **L** | **Piece** |
| 2 | A | ¾" | 10⅜" | 59¼" | sides |
| 1 | B | ¾" | 10" | 35" | bottom |
| 1 | C | ¼" | 34⅞" | 57¾" | back |
| 8 | D | ¾" | 2" | 35" | frame sides |
| 8 | E | ¾" | 2" | 10" | frame ends |
| 3 | F | ¾" | 4¼" | 39¼" | top |
| 1 | G | ¾" | 2½" | 34½" | top facing support |
| 1 | H | ¾" | 2" | 34½" | bottom facing support |
| 1 | I | ¾" | 4" | 34½" | back support |
| 1 | J | ¾" | 3½" | 16½" | top rail (left door) |
| 1 | K | ¾" | 2" | 16½" | center rail (left door) |
| 1 | L | ¾" | 2¾" | 16½" | bottom rail (left door) |
| 1 | M | ¾" | 3½" | 16" | top rail (right door) |
| 1 | N | ¾" | 2" | 16" | center rail (right door) |
| 1 | O | ¾" | 2¾" | 16" | bottom rail (right door) |
| 3 | P | ¾" | 2" | 50¾" | door stiles |
| 1 | Q | ¾" | 2½" | 50¾" | rabbeted door stile |
| 1 | R | ¾" | 3" | 32" | top face frame rail |
| 1 | S | ¾" | 2" | 32" | bottom face frame rail |
| 2 | T | ¾" | 2" | 59¼" | face frame stiles |
| 1 | U | ¾" | 4½" | *62" | skirt material |
| 1 | V | ¾" | 1½" | *62" | dentil moulding material |

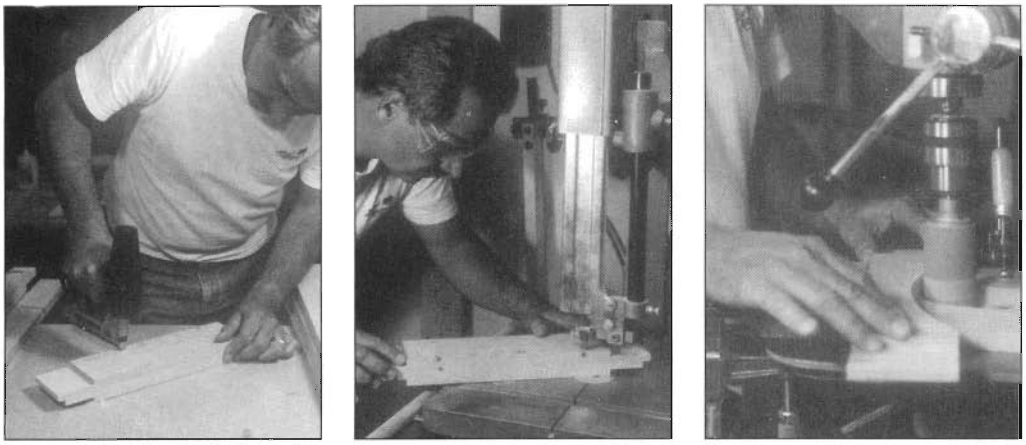
*special cuts


*Apply glue to the bottoms of the dadoes in the side panels and insert the support frames.*


*With the frames and facing supports attached, install the light on the top support's front edge.*

*When biscuit–joining the top panel, keep the end biscuits at least 1" away from the edges. Rout the profile in them with a ½" cove bit.*





***To make the arch on the top door rails, first center and lay out the curve on the shorter one (M). Then align the two back to back and nail them together in the waste area. Cut the curve on the band saw and smooth it with a drum sander in the drill press.***

Glue and nail the top facing support (G), bottom facing support (H) and the back support (I) into position as shown in the Figures. Check the shelf support frames and bottom shelf to see if they stick out beyond the front edge of the side panels. If they do, plane or sand them until they're flush. Now is a good time to attach the lighting fixture to the front edge of the top support.

To make the top (F), glue up a panel slightly larger than needed, alternating the growth rings. Biscuit–join the top pieces keeping the end biscuits at least 1" away from the finished edges. When the glue is dry, scrape away the excess and plane or sand smooth. Cut the profile on the front and side edge with a ½" cove bit in your router.

If you haven't already cut the door rails (J,K,L,M,N and O) and stiles (P and Q), do so now. Note that the right and left doors are not identical. The right stile of the left door (Q) is ½" wider than the other stiles and the left door rails are all ½" longer than the right door rails. You will need to cut two rabbets in order to allow the right door to overlap the left. This detail is important and should not be omitted—otherwise a gap between the doors will be obvious when the display light is on. Label each piece of each door to prevent errors in assembly. Align them all together and mark for the half lap joints. Set up the table saw as before and cut the joints.

Lay out the arch on the top rails (J and M), centering the curve on the shorter rail. Align and nail the two top rails back to back in the waste area and cut the curve with the band saw as shown in the photos here. Use a drum sander in the drill press to sand the curved area smooth.

Glue and clamp the door frames together using two #6 X ⅝" brass screws per joint on the inside if desired. Route a ⅜" wide X ⅛" deep rabbet for the glass panels on the inside of each door frame and square up the corners with a sharp chisel. The glass should not be installed until after you've completed all the finishing work. Cut a ½" wide X ⅜" deep rabbet on the right front side of the left door, and a matching rabbet on the left rear side of the right door.

With the case lying on its back, test fit the doors and the face frame members (R,S and T). If you're going to use a mortised hinge, mark and cut the mortises on the doors and face frame stiles at this time. Measure the depth of the hinge when closed and set the dado blade to one half this height. Attach the doors to the face frame stiles and test fit again. With everything in place, mark the position of the two rails and secure them in place. Glue and nail the face frame stiles in place. Sand the exterior surface of the case until it's ready to finish. It's much easier to do now than after the skirt and moulding are in place.

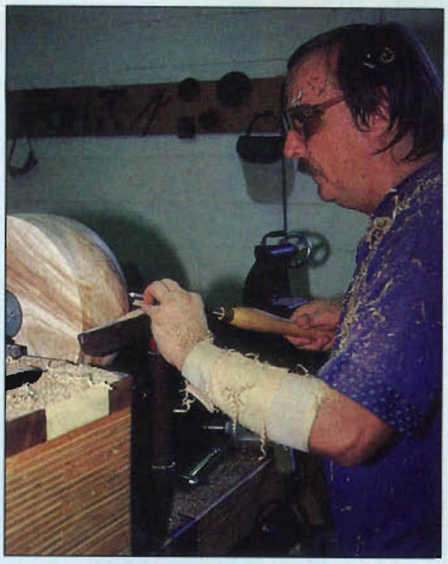
Use a ½" ogee or cove bit in your router to form the profile on the top edge of the skirt material (U). (it's easier to do this first, then cut the individual pieces to approximate length). Cut the miters to the proper length on the front piece then measure and make the cutout on your bandsaw. Smooth the cutout with the drum sander in your drill press. Nail the front skirt into place. Cut the miters on the front ends of the side skirts, put them into position and mark the back end cuts. Make these cuts; then draw the cutout line. Nail the two pieces together in the cutout area, and cut both pieces on your band saw. Sand the cutouts. Glue the miters and nail the side skirts in place.

Make the dentil moulding (V) around the top of the case with the router using a jig similar to the one shown in *Popular Woodworking*, issue 59, page 90. First, rout the ½" cove in the bottom edge of the whole piece, change bits and then cut the dentils. Measure the front piece, cut the miters and nail the molding in place. Cut the miters on the side pieces, hold them in place, and mark and cut the ends. Nail them in place.

Fill all the nail holes with a neutral latex putty and sand when dry. Go over the whole piece with fine paper until you're happy. I finished this piece using light brown Briwax. The wax and stain are combined; rub on—rub off. For the location of your local dealer call 1-800-5-BRIWAX.

The glass for the shelves and doors is ⅛" thick (double strength). Measure the opening for each shelf and door and subtract ¹⁄₁₆" from the length and ¹⁄₁₆" from the width of each. I had the glass cut to size by my local glass and mirror shop. The shelves are held in place by gravity and should be removed when you move the case. The door glass is held in with flush mounting window screen clips. I purchased the light at a lamp shop—it's manufactured by ALKCO, 11500 W. Melrose Ave, P.O. Box 1389, Franklin Park, IL 60131 (708) 451-0700. PW

# Don's Ultimate Lathe



### by Carolee Boyles–Sprenkel

After using a conventional lathe for years, Don Schneider decided he wanted a lathe expressly for turning large bowls. The more he looked, the more frustrated he became. "Nobody makes a lathe that's specifically for bowl turning, and the ones that come close to being bowl lathes are very expensive." He found an English–made lathe on which he could turn a 15" bowl, but he wanted one that would handle bowl blanks up to 28" or 29".

"There's no way to do that on a standard lathe. Almost all lathes are made for spindle turning—turning between centers. You can turn a bowl on them almost as an afterthought. Or, if you try to do it outboard, it's too dangerous. What you have is a free–spinning block of wood, with no tool rest. The only way to fashion a tool rest for use with a very large bowl is to use a free–standing floor tool rest. But a lathe vibrates when you turn it on, and as you're cutting, it continues to vibrate slightly, and a tool rest attached to the lathe will vibrate with it. A free–standing tool rest doesn't vibrate, which means you can't get a really smooth cut. You can do rough but not fine work. Another problem is that the stock is turning backwards. Instead of working on the left–hand side, you're working on the right, so all the tools are skewed in the wrong direction." After a lot of frustration, Don decided to build his own lathe. Here's how he explained it to me.

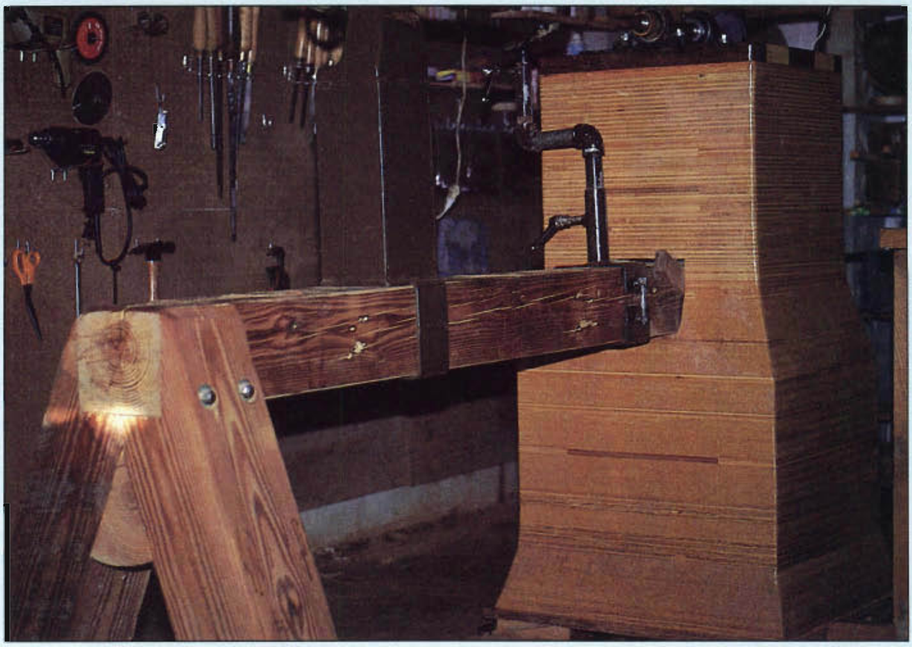
*__Carolee Boyles–Sprenkel__ is a free–lance writer in Quincy, Florida. Her subject, __Don Schneider__, is a woodworker in Tallahassee, Florida, whose bowls and wood sculptures have won prizes in international competition.*

## Make It Solid

For feet, I mounted five 2" maple blocks to a 28" square piece of ¾" plywood. On that bottom, I built a tall, tapered base by laminating pieces of heavy–duty particle board for weight and pieces of plywood for stability. The layers alternate and are held together with carpenter's glue and 2" square drive screws. The base tapers gradually in steps. It tapers to 24" square through the bottom 7". The sides are straight for the next 17"; then they narrow for the next 8" until the structure is 20" square. The sides then continue straight up to a height of 52".

The back side of the base has three openings. The first, a 12" X 14" X 14" hole starting 12" off the floor, holds extra weight. When turning a large or heavy piece, you can put lead weights in the opening to help stabilize the lathe.

The second opening, starting 25" from the floor and measuring 6½" X 6½", goes all the way through. The lathe bed, a 6" X 6" pine heart beam, passes through the base here and is supported by it. The beam is long enough to permit turning a piece of stock up to eight feet long, and can be replaced with a longer beam if necessary. It's not fastened to the base, but secured with hardwood wedges, making it fairly easy to move or replace. The free end of the bed timber is supported by two additional pieces of 6" X 6" heart pine, at



photos by the author

***Up top are two of Don's pieces—a wormy spalted pecan bowl and a Hopi–inspired walnut bowl. Above right, Don turns camphor wood on his massive home–built lathe.***

one end to fit the end of the lathe bed. I trimmed the legs so the bed is level, and bolted them to the beam.

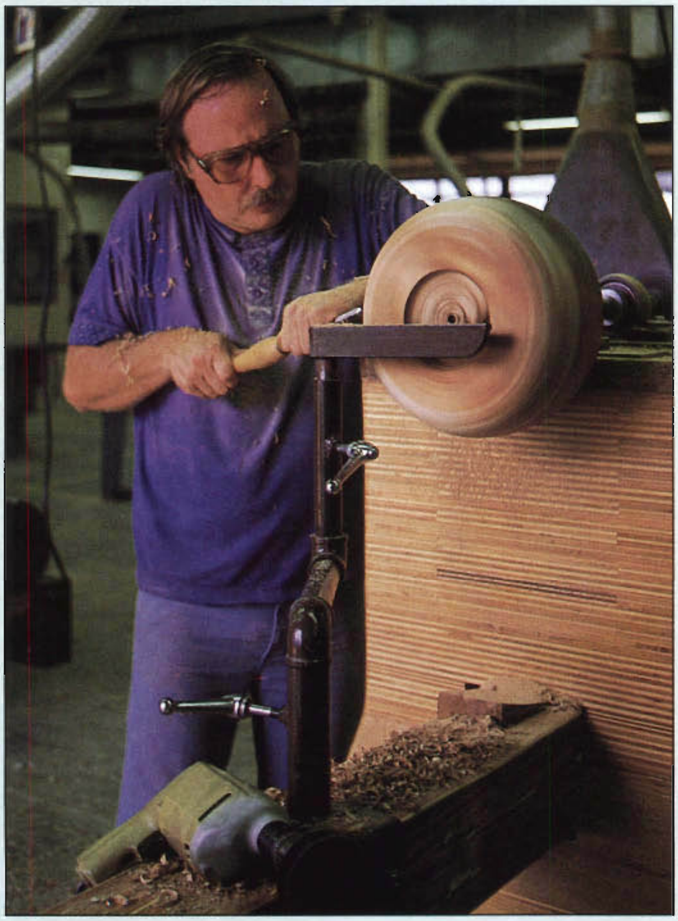
Above the opening for the lathe bed is a third cavity for the moving parts of the lathe. Starting 34" off the floor, it's 16" X 12" X 12", just large enough for the motor and transmission. This opening does not continue through to the front of the lathe in order to protect the moving parts from dust (and the operator from the moving parts).

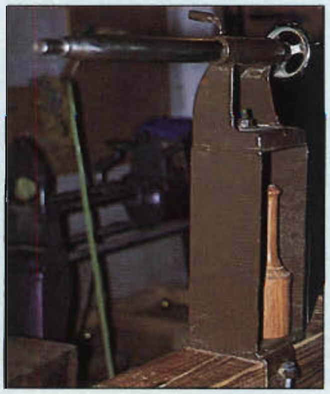
I capped the base with a 2" thick hardwood top made of edge-glued strips of walnut and holly. Close to the back of the top, I made a 2¾" X 7¼" opening, 2¾" from the back edge and parallel with it. Also, before installing the cap, you'll need to sandwich in two pairs of steel plates for reinforcement (more on this later). I finished the entire base with eleven coats of polyurethane. The weight of the base alone is 550 pounds. Not only is it stable, it's aesthetically pleasing (in its own massive way).

The head stock holds the work high enough so I can work comfortably while standing. It seems that every commercial lathe is built 33" to 37" off the floor—fine for someone 5'6" or 5'7" tall. This one's 54" off the floor.

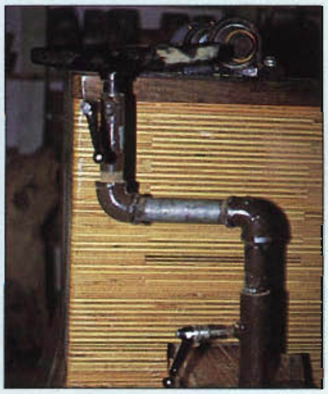
## Make It Move

Once the base and lathe bed were finished, I found a 1½" diameter, 18" long steel rod to serve as a shaft for mounting the faceplate and bowl stock. A friend who works at a local machine shop turned the back end of the shaft (where it links to the

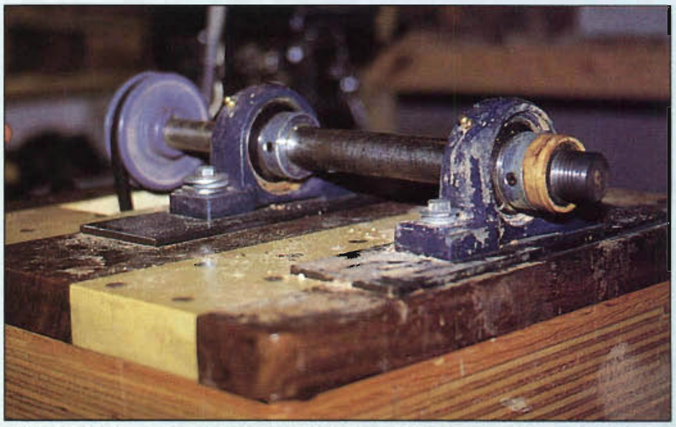




*Don salvaged the tail stock from an old metalworking lathe and mounted it on a custom-welded frame which bolts around the bed beam. Note the long ram.*

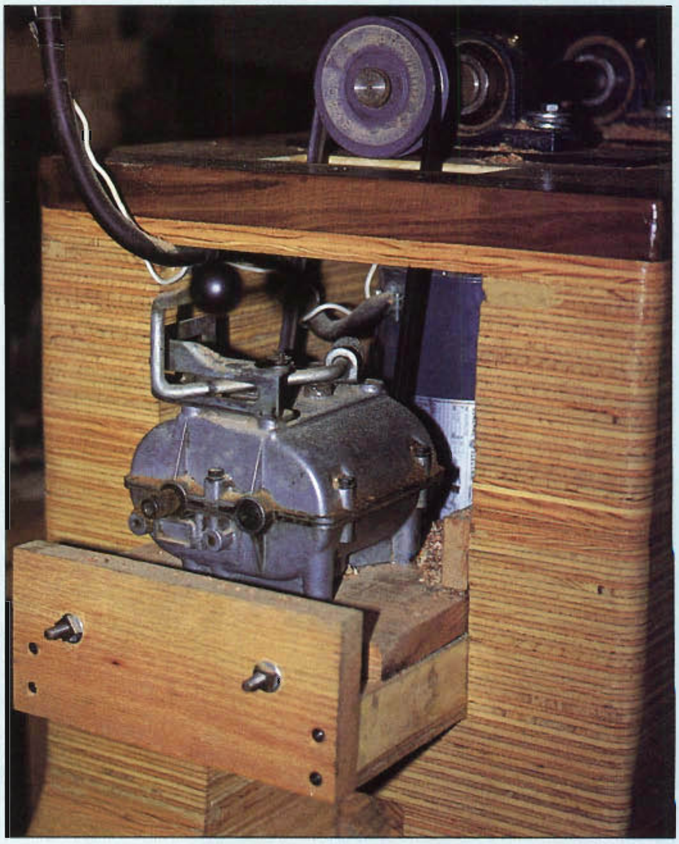


*This tool rest with its horizontal arm and set-screw fittings permits the turner to reach any part of the bowl on either side of the lathe.*



***Above is the lathe top and the shaft. Note the 4" pulley going down to the transmission, and the two pillow block bearings. The threaded "business" end of the shaft faces the camera.***

***The photo below shows the back of the lathe. The motor is hidden inside the top opening behind the transmission which is bolted to an oak plate and runners. The rails, end plate and transmission are visible. The power cord rises to the left.***



transmission) down to 1" in diameter to accommodate a 4" V–pulley with a 1" inside diameter and a 4" outside diameter. On the "business" end, he turned 8 threads to the inch for a distance of 1¼". The shaft will now accept a standard faceplate.

To support the shaft I bolted a pair of Series E–type pillow block bearings to the top of the lathe base. The shaft assembly is reinforced under each bearing by sandwiching the base cap between a pair of 5⁄16" steel plates, each 4" X 16". Thus the bearings and shaft are bolted to both the hardwood top and the steel plates.

I spent a lot of time thinking about different kinds of motors and the devices they power. The solution is simple enough—a standard two–horsepower motor I picked up for less than $50, and a transmission from an old riding lawn mower.

The problem is how to reduce the speed enough to permit turning large stock. Most lathes start out around 450 and go up to 2000 rpm, but that's too fast for bowl–turning. What you need for a large bowl is about 125 rpm to start, with a top speed of around 1000 rpm. To get that kind of speed variance without a transmission would require a whole pocketful of different sized pulleys.

I worked out the necessary pulley sizes by trial and error—an RPM indicator checked the speed of rotation using 2", 4" and 6" V–pulleys. A standard 1½" pulley at the motor and a 4" pulley on either side of the transmission resulted in 125 rpm. The other speeds on the transmission bring the rate of spin up to 950 rpm, which is just fine. The transmission happens to be a Peerless Model 90, and is identical in speeds to the ones still made today.

In order to connect the motor directly to the transmission without the use of idler arms, I bolted the motor vertically to the back of the housing opening in the base structure, with the shaft for the pulley at the bottom. A 2" V–pulley—the only 2" pulley in the entire assembly—was mounted to the motor shaft. If at some point I want to change the speeds, this is the logical place to do it. Replacing this 2" pulley with a 4" one will double the rpm's.

## Partial List of Materials

- five 2" maple block legs
- ¾" X 28" X 28" plywood bottom plate
- heavy–duty particle board and plywood panels laminated to form the base structure
- 6" X 6" pine heart beam for the lathe bed
- hardwood wedges
- two 6" X 6" heart pine beams for the bed legs
- 2" thick top of edge–glued strips of walnut and holly
- two pairs of 5⁄16" X 4" X 16" steel reinforcing plates
- 18" X 1½" diameter steel rod for mounting turning stock
- one pair of Series E–type pillow block bearings
- standard two–horsepower motor
- Peerless Model 90 transmission with 4" pulley
- 2" V–pulley
- two 1" X 2" X 15" red oak runners
- ¾" X 1" X 15" red oak end piece
- ¾" X 12" X 15" red oak transmission base plate
- two table–leg anchors
- the tail stock from an old metal–turning lathe
- ¼" X 3½" X 24" steel, bent to fit around the bed beam
- lengths of steel rod, galvanized pipe and assorted fittings for custom tail stock pieces and tool rests

Here's how I mounted the motor and transmission. I started with a pair of 15" long 1" X 2" wood runners in the outside bottom corners of the motor cavity. They extend 4" out of the opening. Across the ends of the runners, I bolted a piece of ¾" thick red oak, 2" high and 15" long. The transmission is bolted to a piece of red oak ¾" thick and slightly under 12" wide, with a hole drilled in it for the transmission shaft. Using two table leg anchors as bolts, I secured the oak piece across the ends of the runners to the edge of this oak plate. The transmission shaft, with a 4" pulley on it, extends through the plate beneath the transmission and connects to the motor pulley with a V–belt. By tightening the anchors, I can pull the transmission away from the motor, thus tightening the V–belt between them as it stretches with wear. I ran another belt from the shaft on the side of the transmission up through the hole in the cap of the base structure to the pulley on the turning shaft.

## Add A Tail

To find a tail stock that would accommodate a 40" bowl blank, I had to do a bit of digging. I found an old metal–turning lathe in a junkyard and took the tail stock from that. It's mounted to a three–sided steel framework that raises it 20" from the lathe bed. A blacksmith friend of mine bent a piece of steel 3½" wide, ¼" thick, and slightly less that 24" long, into an "open square" that fits around the lathe bed. On the side where the two ends of the square meet, the smith welded a ¾" nut above the opening and a ½" nut below. I can secure the tail stock to the bed by mounting it on the open square base and dropping a 3" X ½" bolt through the ¾" nut and threading it into the ½" nut.

My friend at the machine shop turned a tail stock piece 18" long. I like to work on a big bowl from the side, and if I have a standard tail stock piece, which is about 2" or 2½" long, I can't get close enough to my work. By adding this long ram, I can set the tail stock in as extra support on the work and tighten it down. I can still work on either side of the lathe, on the top of the tail stock piece, or on the bottom of it. I can move all around my lathe, which you can't do with a standard lathe. The tail stock can be adjusted in and out a distance of about 4".

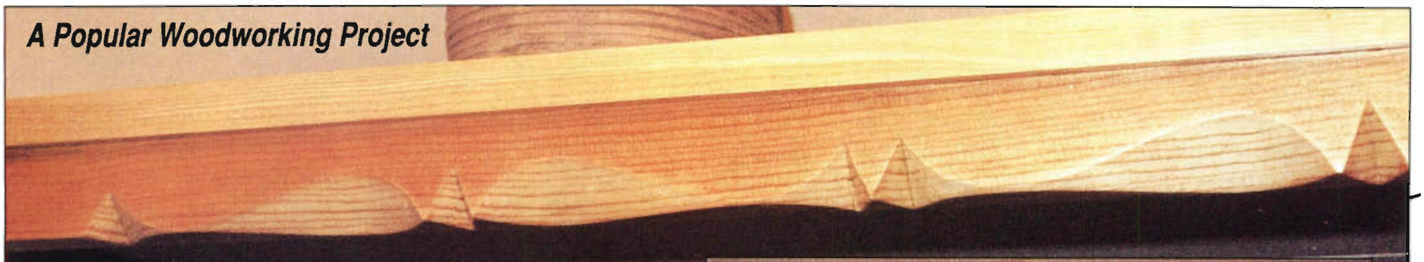
The same open square mounting serves the tool rest. The blacksmith mounted a short piece of galvanized pipe with a 1⅛" inside diameter to the top of the mount, and then welded a ½" nut to the side of the pipe. He drilled out the side of the pipe to accept a threaded handle, which created a set screw–type fitting for a 1" outside diameter piece of pipe which is inserted in the pipe on top of the mount.

I use two different tool rest supports. One is simply a straight piece of pipe that fits into the tool rest base, topped with another set screw fitting to accept the tool rest. The other is made of three short pieces of pipe connected by right–angle elbows. With it, I can position myself wherever I need to achieve the safest and most effective turning.

When the lathe was finished, I padded the floor under it with a rubber mat and leveled the tool with hardwood shims.

I don't know of anyone who makes a lathe with a 40–inch swing over the bed. Even if someone did, I think it would have to be in the $3000 to $4000 range. With a little scrounging, I was able to build mine for less than $500. PW

A Popular Woodworking Project



author

# Elegance with Edge Chamfers

### by James E. Seitz

Need a simple but elegant way to dress up projects? Try decorative edge chamfers on clear–grained horizontal sections of plain pieces, especially at eye level. Consider placing a gracefully curved bevel on the edges of chairs, tables, chests, bookshelves and fireplace mantels. Any furniture or cabinetry with a flat trim board positioned like an apron or valance may be right for this creative touch. Add a bit of carving to the shelf in the closet where guests hang their coats, and you'll hear about it.

If your closets are equipped with sheet metal shelving, drill holes every foot along the metal face and attach a carved strip from the back with short wood screws. You'll probably find the warmth of a wood strip finished in the natural to be a welcome replacement for the painted sheet metal shelving so often built into homes today.

Such evidence of craftsmanship can increase the value of a house. People admire

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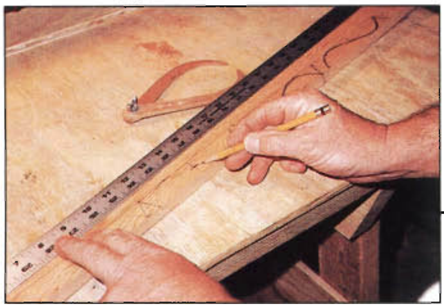
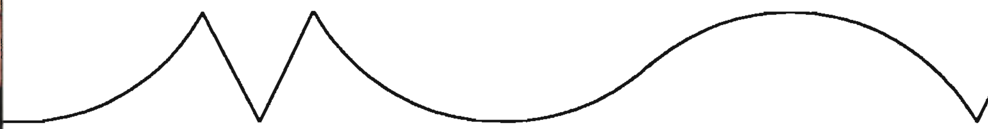
***James E. Seitz, Ph.D.**, is the author of* Woodcarving: A Designer's Notebook *(Sterling).*

*Draw the ogees after measuring intervals and marking guidelines.*

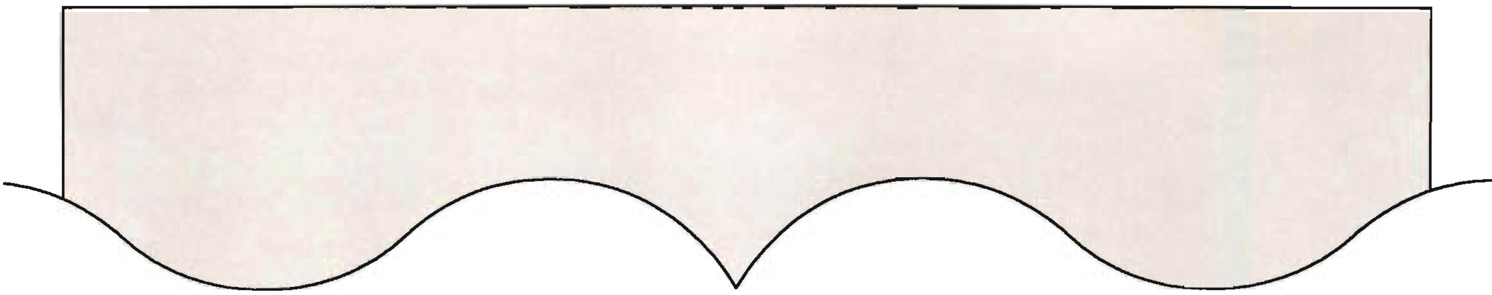




*Use a square to transfer the layout to the strip's edge.*

*Make the straight cuts in the design with a fine–bladed saw.*

*Carve the sweeping curves with a flat chisel (bevel down) and a hardwood mallet.*



the care taken to decorate places that usually receive nothing more than a coat of paint; such care within closets, for example, will enhance one's impression of the entire house.

## An Easy Process

Always plan and complete the edge carving of a strip before attaching it, and whenever possible make the attachment before installing the shelf. Of course, closet shelves are usually fixed in place long before the idea of decorating them comes to mind. In such cases, merely carve a piece of the size needed for use as an apron and nail or screw it in place beneath the lip of the shelf. Make the strip nearly equal to the shelf's length (allowing for a slight end clearance) and about 2½" to 3" wide for closets of ordinary proportions.

Select wood for the apron strip that blends with the piece you'll attach it to. It should have fairly straight grain and no checks or serious blemishes. After cutting and smoothing the strip, prepare it for carving by pencilling in guidelines. Mark off the part to be carved, leaving an uncarved section at each end, and divide the distance into equally spaced sections according to the size of the ogee you want to carve. You should normally allow several inches of uncut distance at each end of the strip. Draw the gauge line for the ogee's height a distance from the edge about equal to the thickness of the board. In that way, the carving will result in a chamfer of about 45°.

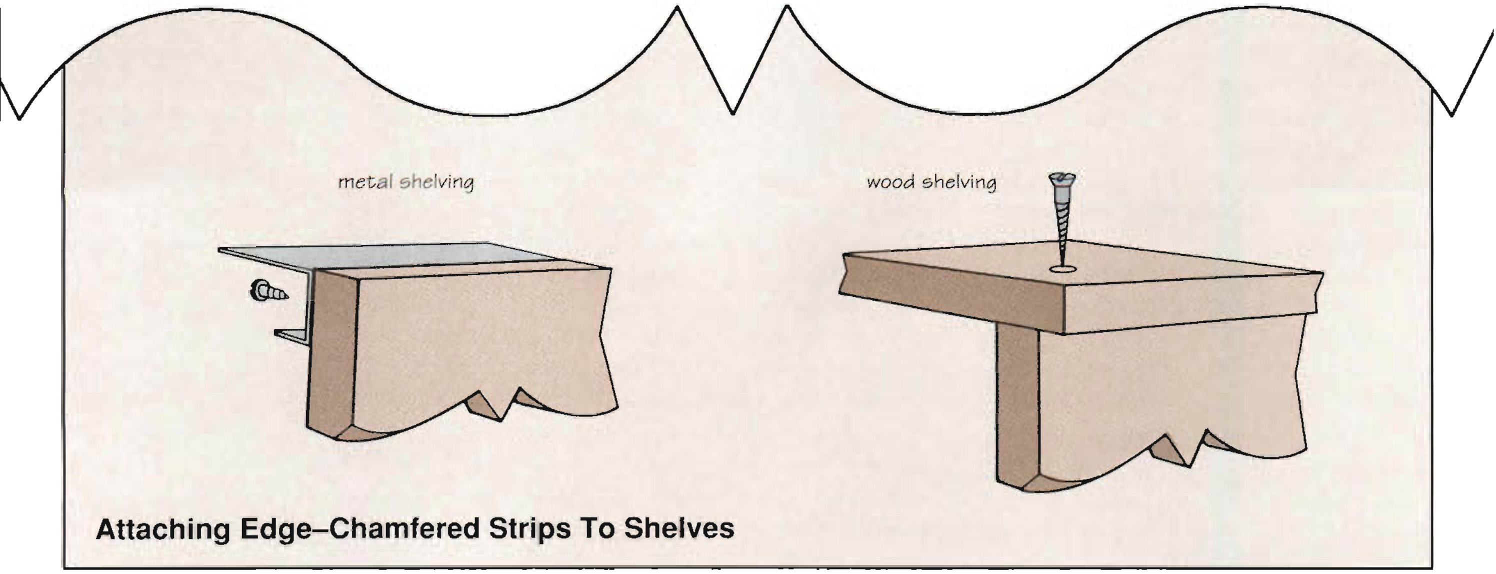
Considerable personal discretion and sense of proportion enter into the design. The length of the repeated curve, the number of repetitions and the height of the ogee all contribute to the beauty of the design. Try extending or shortening sections of the curve from one piece of wood to the next. When making the layout, draw the sweeping curves of the ogee on both the edge and the face of the strip. At first use a template cut from cardboard in the shape of the repeated section, but learn to sketch the lines freehand between guide points. Draw with a soft lead pencil and press lightly so you can easily remove all traces of the lines after carving.

## Chisel, Mallet, and Saw

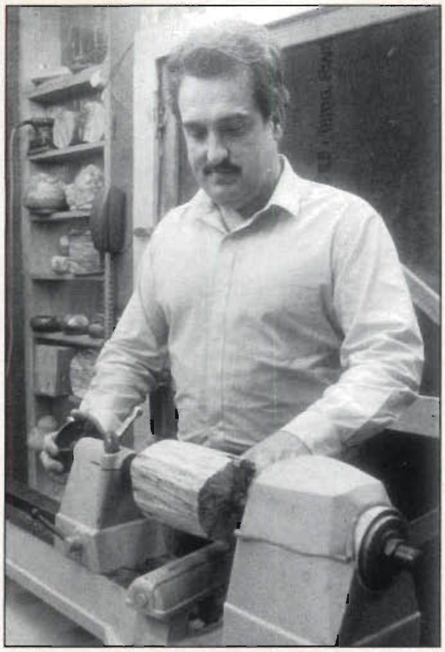
Make the straight cuts with a backsaw before carving. Also make cuts at the mid–point of each deep curve for guiding the chisel to the right depth. Shape the chamfer with a flat chisel. Pay close attention to holding the chisel at the proper angle when tapping it with the mallet—you don't want to drive it deeper than the design requires. Always make stop cuts to prevent the grain of the wood from splitting too far. Complete the carving with chisel and mallet by removing the wood clear to the pencilled lines. Shape and smooth the ogee to its final form by paring the curves with the chisel. Sand them sparingly with a fine abrasive, and only where it's necessary to remove a rough spot.

To attach the apron strip to a shelf board, lightly glue and either screw or nail it into place by driving the fasteners through the top surface of the shelf board. Allow about a 3⁄16" overhang.

For a final finish I recommend a coat or two of polyurethane over the raw wood. If you choose paint or stain, it should be light in color. Dark colors tend to hide the carving, especially in closets with overhead lighting. PW



**Attaching Edge–Chamfered Strips To Shelves**



# Dr. Smith's Spalted Wood

### by Valerie Balser Winn

For dentist and woodworker Ken Smith, decay has taken on a unique meaning. He may fight it in his profession, but he cultivates it in his hobby—he turns decayed or spalted wood into bowls, vases and other sculpture. Ken finds that spalted wood provides a fascinating and challenging medium for him and his lathe.

"I try to create beauty from a decaying piece of wood." It's also ironic that his supply of spalted wood results from the hurricanes of the Gulf Coast. "The destruction caused by the storms provides this beautiful wood." Some of the best sources of uncommon spalted wood are dead and fallen trees, especially those that have been lying around for some time.

One year after Hurricane Elena swept through the area in 1985, Ken found his first pieces. They were from a magnolia tree that had fallen on a neighbor's property. When he saw the wood, he thought that it might be spalted. The ends of the log displayed the pattern of dark lines, known as zone lines, that are the trademark of spalted wood.

"I wasn't completely sure it was spalted, but I took it home and cut off the end of the log with the saw. I knew immediately that this was a rare jewel of nature and my first sample of spalted wood. I was very excited that it was magnolia, a real piece of Southern heritage." Because the magnolia—Mississippi's state tree—is not harvested in the South, finding it was rare and special. Most of the magnolia trees that have to be removed in urban areas are burned.

Working with spalted wood takes stamina. Not only does turning the brittle, porous wood require skill, but waiting as long as two years before it is ready for turning can test one's patience, too. The waiting period is part of the cycle of giving the temperamental wood new life.

Spalting in wood is caused by water and fungus. It usually occurs in fallen wood over a two–year period. First, fungus pervades it. This initial stage is called **incipient decay**. After the fungus establishes itself, it advances until the wood fiber is decomposed. The dark lines result from the fungus advancing into the wood with its carbonaceous deposits. At this point, the small filaments of two competing fungi clash. Ken compares wood in the spalting process to plywood or sheetrock that gets wet. Where the water stain stops it leaves a sprawling pattern. The spalting process in wood, however, is more complex.

It's affected by weather and locale. Ken recommends moist, dark, forest–like areas for finding the best spalted wood. Rich, dark soil helps to start spalting. Mushrooms near fallen logs, rotting leaves and moss are good indicators of spalted pieces.

The process occurs at different rates for different trees, depending on climate and location. Magnolia spalts in about one year. Under the right conditions, spalting occurs consistently in birch, beech, maple, elm, gum and most fruitwood trees. Most of the "white wood" hardwoods show good spalting. In addition to magnolia, Ken's supply consists of cypress, sycamore, oak, hickory, pecan, maple, gum, popcorn and dogwood. Oak sometimes spalts, and he has a small supply of it. The best oak spalting occurs in the southern states.

Although most spalting occurs within two years, some wood, such as white birch, spalts a little faster. Soft maple will spalt in two to four years while rock maple takes from two to five years. It's very important to find the wood at the right stage of decay. If it has decayed too long, it will be too rotten to work with. Found too early, it will not have developed the thick lines which give it its distinctiveness.

Ken searches for spalted wood every winter, avoiding snakes, bugs and other creatures. He spends hours searching the nearby rivers and adjacent areas. After it's found, the wood must then go through a drying–out, storage process so that it's just right for working. If the wood is moved indoors too quickly, it will crack. He leaves it outside, but coats the ends of the logs with latex paint or wax so it doesn't lose its moisture too fast. His wood goes from the forest to the drying shed and then to his shop. By collecting every year, he builds up a constant harvest.

Ken values every piece he finds. "One thing I've learned about spalted wood is that what you think may be too far gone, changes once it dries out."

"Working with spalted wood is like try-

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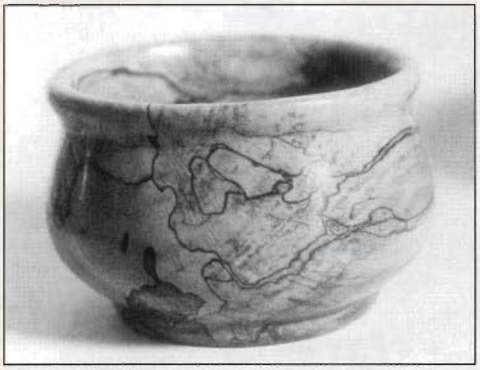
***Dr. Ken Smith** works wood (and teeth) in Gautier, Mississippi. Free–lance writer **Valerie Balser Winn** also lives in Gautier.*



ing to sandpaper a sponge; and every piece is uniquely different." One thing that makes this wood different and difficult to work is its texture. It is light, porous and extremely rough. It takes quite a bit of getting used to. It took Ken many hours to learn how to turn a piece without destroying it. "I wasted a lot of wood, but I had a lot of fun."

Wearing a face–shield is a must because spalted wood contains dead bugs and other debris which can fly out while the wood is spinning. It's also common to hit certain areas in the wood which cause it to break apart.

Ken uses a variety of techniques. He's found that filling in some of the holes in the wood with epoxy and sawdust before sanding gives the wood a smoother finish and camouflages the holes so they look like part of the spalting process. Techniques vary from one piece to another because of the density of the wood. Some pieces are dense enough to be worked like a regular piece of wood, but if the decay is more advanced, it may need to be painted with carpenter's glue mixed with water. Before turning, Ken cuts most of the wood into a circular shape or a shape that will resemble the finished piece. After it's shaped, it can be left that way for a while to complete shrinking.

Tools must be very, very sharp for turning spalted wood because it does not scrape well. "When you hit one of the holes, it knocks a big chunk out. Sometimes these holes can be filled in with glue and sawdust, but usually you just start with another piece."

Sanding is especially time–consuming. Usually he'll begin sanding a piece with 30–grit paper to knock the wood surface down. Then he progresses to 400–grit and #0000 steel wool. There are no shortcuts in working with this wood to get it smooth. He often uses a drill with flapper attachments. Sometimes he uses sponge–type sanding devices, sometimes a homemade valve stem with sandpaper attached to it for getting at the inside of small bowls.

For finishing pieces, Ken sometimes uses a mixture of one–half polyurethane and tung oil. He also coats pieces successively with tung oil, using steel wool between coats. Other finishing touches call for polishing with jeweler's rough or beeswax.

The shape of the vessel he makes depends on the texture of the wood, and most of all, on the spalting pattern. Rough, full shapes seem to show the wood's pattern best. "All in all, this seems a great way to display the waste and fury of nature—and have fun in the process." **PW**

Ken Smith

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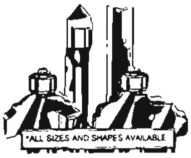
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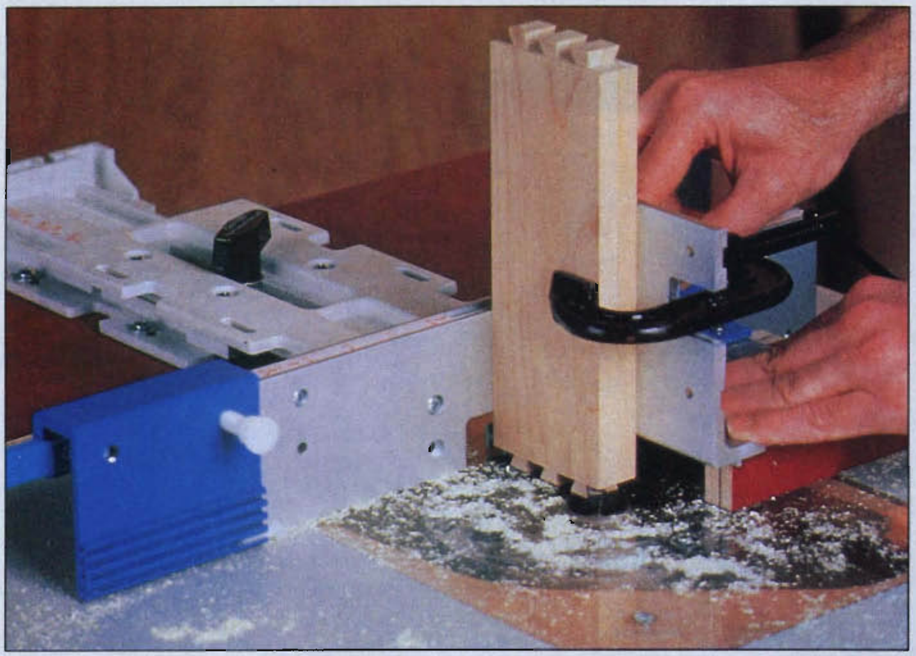
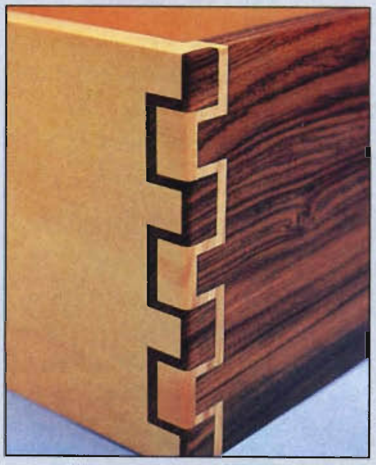
# Shop Gadgets





### by Sanford Wilk

The *American Heritage Dictionary* defines the word *gadget* as a "small specialized mechanical device." The thirteen gadgets tested here, of course, are or claim to be of benefit to woodworkers. Most are designed to work side by side with power tools, but a few work on their own. We tested devices that duplicate unusual angles, a bench designed for quick access, and even a machine that can make rigid laminate flexible. Prices range from under $40 up to $200; all are list prices. They make great stocking stuffers!

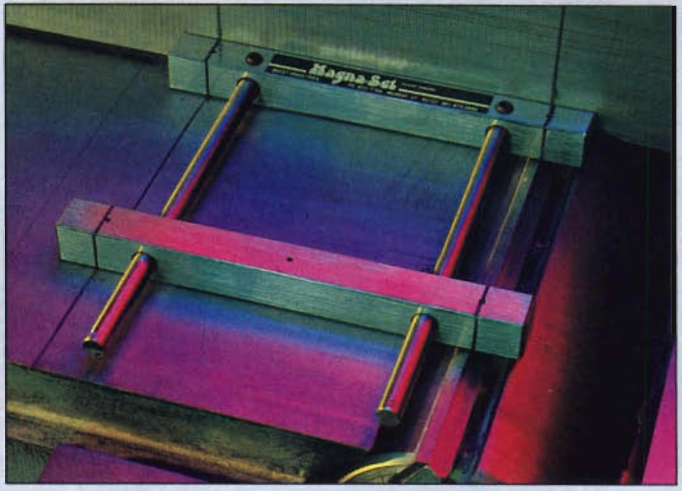
## Incra Alignment/Indexing System

This tool consists of the Incra Jig, Fence, and Right Angle Fixture ($124.95). The professional, as well as the inexperienced woodworker, can benefit from this system. You can produce extremely accurate dovetails in a vast variety of sizes and shapes. So great are the options here, that you're limited only by your creativity. And the system isn't limited to dovetails. With the aid of a drill press, the gadget will make a series of perfectly spaced holes. It can be used just as readily on the table saw for indexing operations. Let's say you want to inlay a jewelry box cover with several different woods. Using the Incra System, you can shift over a prescribed distance for each cut and be confident that they'll all be exactly where you want them.

Basically, the Incra Jig is designed around a sawtooth rack system with $^1/_{32}$" increments between notches. If you're not happy with that increment, however, you can micro–adjust the rack by shimming it and get as tight as 0.001". Add to that a series of color–coded plastic templates that snap into the jig and position it for the joint you intend to make. You don't need to locate the dovetail by measuring — just line up the colored marks. Even a novice can get the kind of accurate layouts that once only an expert woodworker with plenty of time could manage. "Gadget" may not be a fair description of the Incra system. It's an impressive fast layout device — our tester chose to build a router table especially for it. Now that's a vote of confidence. (Taylor Design Group, Inc., Box 810262, Dallas, TX 75381. 214-243-7943)

## Magna–Set Jointer Knife Setting Jig

This little item effectively eliminates the time and hassle traditionally associated with getting your jointer knives set just so. It incorporates two bars that each contain three magnets. The



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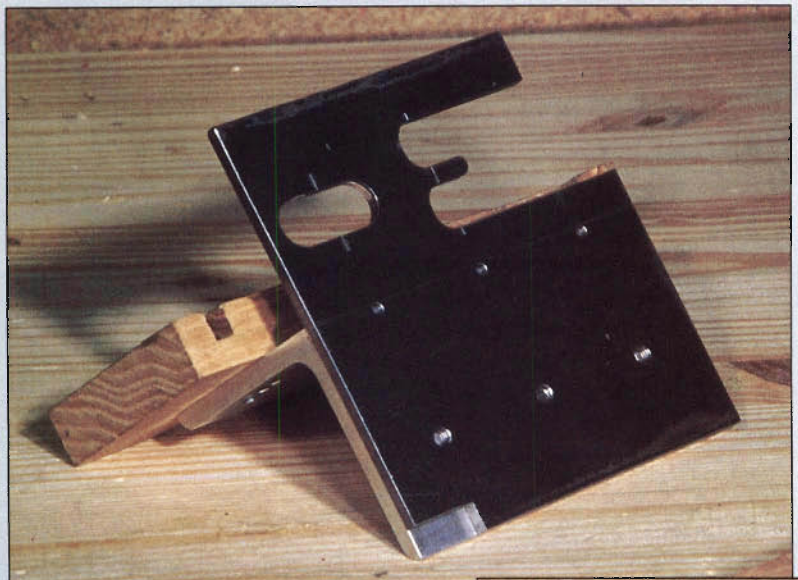
***Sanford Wilk**, a builder and organic architect in Boston, Massachusetts, heads a team of craftsmen who evaluate tools under actual working conditions.*

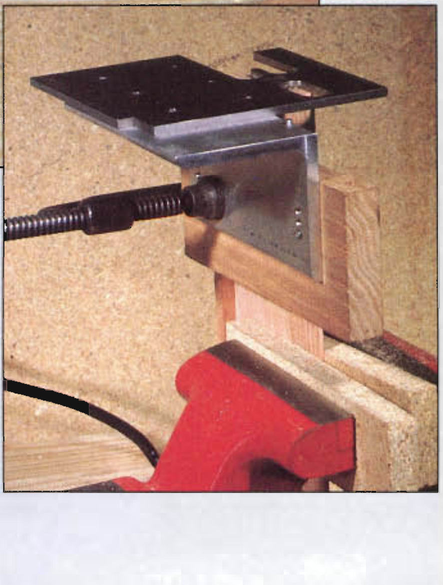
bars attach themselves to the jointer's outfeed table — the typical leveling standard for machines. The bars project over the cutter head with another magnet suspending the knife at exactly the same height as the outfeed table. The jig allows perfect alignment, and frees up your hands to tighten down the knife. If you nick both blades, you can still get a good cut on the jointer by using the jig to offset the blades.

As an option, you can spend a little more and buy a solid carbide version that magnetically suspends solid carbide knives. It can also be used on magnet–resistant outfeed tables such as aluminum alloys. Thanks to its 13-ounce weight, it will stand correctly even if the magnets refuse contact. The manufacturer offers a no–questions–asked, money–back guarantee if your unit ever fails to give you tolerances at least as good as 0.001". We doubt you'll ever take them up on the offer. ($49.95, Uniquest Corporation, Box 7768, Murray, UT 84107)

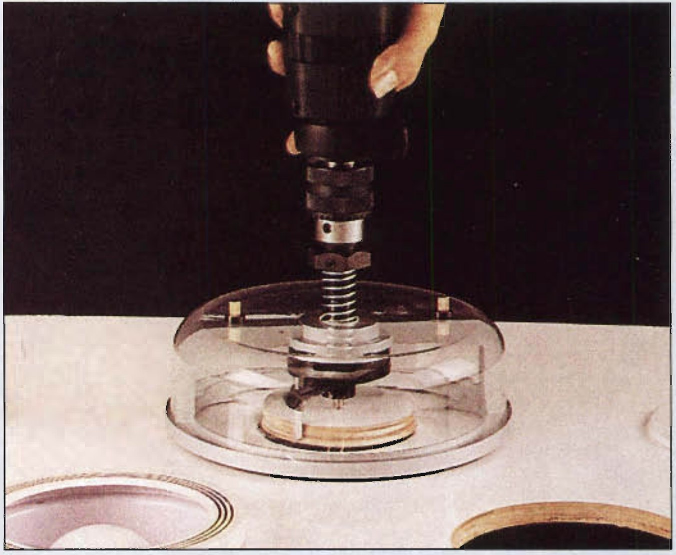
## Porter–Cable MorTen Mortise And Tenon Jig

This inexpensive router accessory makes quick work of mortise and tenon joints common in furniture making. A single guide plate functions on one side as a layout for the mortise and on the other as a guide for the tenon. By C–clamping it to your workpiece and aligning the template over the spot you want to cut, you've already completed the hard part. Now run your router around the guide's edges. No fancy layout work is required and the simplicity of the unit, in both construction and use, is *unrivalled* by any other mortising method I know of.





Nowadays everyone's hot for biscuit joiners because they're easy to use and speed production. But there still are some diehard mortise and tenon folks out there who claim greater stability and a larger glue surface. If you haven't become new–fangled yet, take a look at this jig. If you've switched over to a flat doweling machine, then you still might want to consider this gadget simply to extend your shop's capabilities. ($60.00, Porter–Cable, 4825 Highway 45 North, Jackson, TN 38305. 800-321-9443)

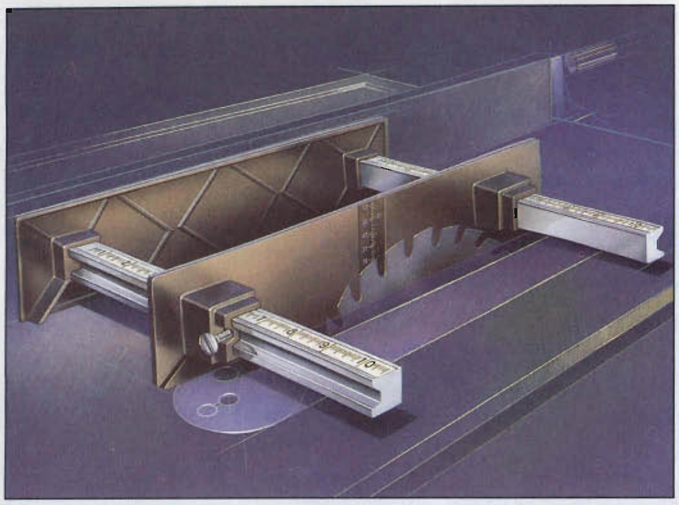


## Outwater Plastic Hole Cutter

This unique gizmo is an adjustable hole saw. It makes round holes in all types of materials and comes with both a high speed steel and a carbide knife. The steel is good for drywall, wood, and plastics, and the carbide makes nice cuts in aluminum, brass, fiberglass and solid surface materials like Corian. It will cut a hole as large as $6^{3}/_{8}$" in diameter and as thick as $1^{3}/_{4}$". A built–in debris shield is integrated into the unit. The shield is clear, so you can see the hole as it's being cut and it really contains the debris, which is a great feature, especially when making overhead cuts. Two other features emphasize operator comfort — a compression spring that serves as a shock absorber during the cut, and a balance bar that counteracts the inertia of the cutter arm as it spins. Together, the two make for a very smooth cut without rattling the woodworker. We tested the unit in hardwood plywood, and despite the thin veneer on the face of the stock, we had no splintering. It cut as smooth as a razor and the results were just as good on other types of material. ($79.95, Outwater Plastic Industries Inc., 4 Passaic Street, Wood–Ridge, NJ 07075. 800-888-0880)

## Paragauge Saw Alignment System

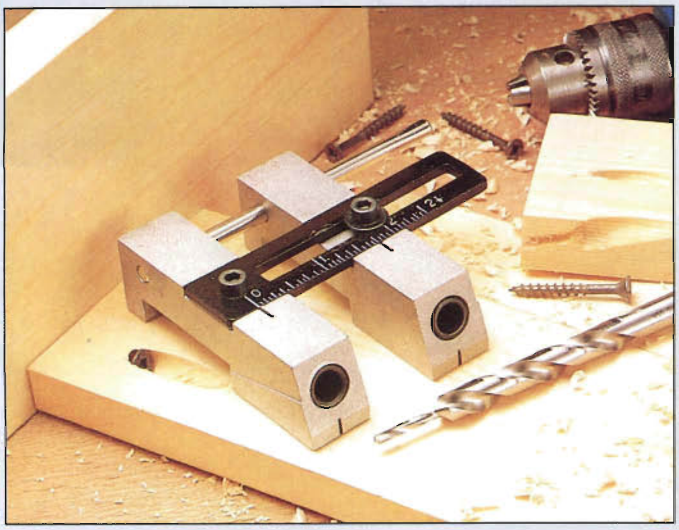
This device aligns the fence with the saw blade to assure that both are parallel. It also gives you a measurement from fence to saw blade, and the blade height. You're really not limited to the table saw here, either. You can use it on any tool with a fence system. A fence that's not set true to the blade can result in kickback as well as expensive stock blunders. This tool takes the error out of the equation with speed and ease. By adjusting the two



sliding bars, you assure correct fence placement. We found it extremely useful on saws with borderline–quality fences. The company guarantees accuracy of 0.01". You can purchase the tool in 12" or 18" lengths. The Paragauge's extension bars are extruded aluminum for long life and accuracy, and the plates are made of a space age material called Valox 735. This stuff won't scratch your tabletop and won't distort or lose its shape. ($34.95 and $39.95 plus shipping & handling, Accuset Tool Company, Inc., Box 1088, Troy, MI 48099. 800-343-6129)

## Leichtung Workshops' Double Pocket Hole Drill Guide

This simple gadget is a one–trick pony. All it does is align the drill bit with the stock for 15° pocket holes. The neatest part of the setup is the stepped drill bit that comes with the tool. It drills a pocket hole $^3/_8$" in diameter as well as a $^3/_4$" deep X $^1/_8$" diameter pilot hole for the fastener. The unit is made of aluminum with hardened steel bushings that serve as drill guides to protect the aluminum body. All you need to do is clamp it firmly to the stock and run the drill in. What you get are perfect holes for pocket fastening. You can also drill in tandem since the unit can drill twice without being moved. It offers you the option of spacing the two holes anywhere from $^7/_8$" to $2^7/_8$" apart by loosening the allen screws and sliding a moveable block into position along a scaled bar. ($6.10, Leichtung Workshops, 4944 Commerce Pkwy., Cleveland, Ohio 44128. 800-321-6840)



## Skewdriver

The Skewdriver is an offset driving system. We tested the Skewdriver Pro Kit, which comes with a wide assortment of bits and nut driver tips. The unit can be operated by hand or, if you want more torque or speed, you can install it in a drill or cordless driver thanks to the standard $^1/_4$" driver. It's all metal (except for the plastic handle base that you don't use in power tools) and it comes with three different extension lengths. In a nutshell, the unit is a gear–driven transmission that can efficiently convert supplied torque energy to an offset angle. You can go as high as 100 inch/pounds in terms of torque, or 400 rpms for speed. We ran the unit well beyond the manufacturer's suggested range with no problem, but I recommend you stick to the given thresholds. The manufacturer claims that the Pro Kit allows up to 156 possible screwdriver combinations; the model 6426 kit comes standard with 30 bits. If you've ever skinned your knuckles trying to drive fasteners on an offset, then you'll know why we recommend this unit. ($49.99, Skew Products Marketing and Distribution, Inc., 407 New State Hwy., Raynham, MA 02767. 508-880-8800)

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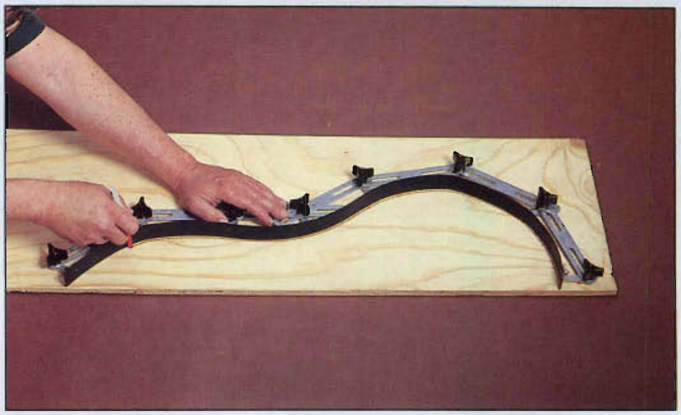
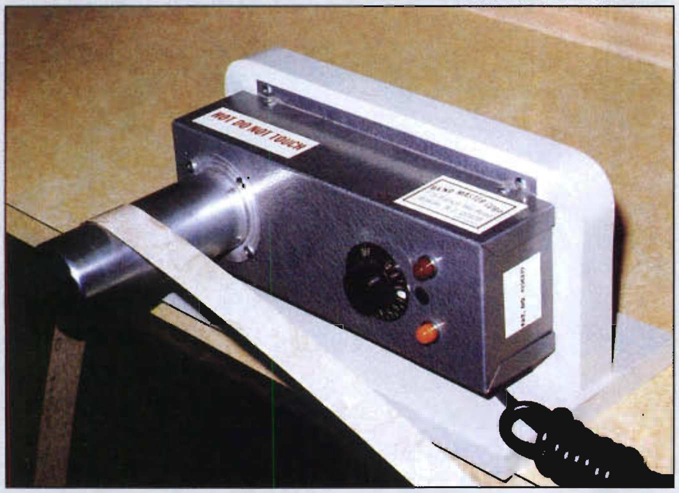


## GDE Sidewinder Flexible Curve and Contour Gauge

This tool comes in three lengths — 3'1", 5'7" and 8'11" for applications ranging from small furniture projects to building archways. Traditional flexible curves don't hold their accuracy in many work situations. Transferring a layout from one surface to another usually involves moving the curve, which typically changes the original shape. With this gadget you get a flexible metal strip attached to a series of sliding brackets equipped with locking knobs. Those knobs are nicely sized and hold their position well. When they're tightened, the Sidewinder loses its flexibility and becomes a mercilessly rigid template. You can move it across the room or across the country — it retains its position. We dropped it three feet onto a concrete floor, but it kept the curve true to the original. Accuracy and durability are finally back in fashion. ($79.95, $114.95 and $169.95, JC Woodworking Equipment Supplies Inc., Box 161837, Miami, FL 33116. 305-596-5806)

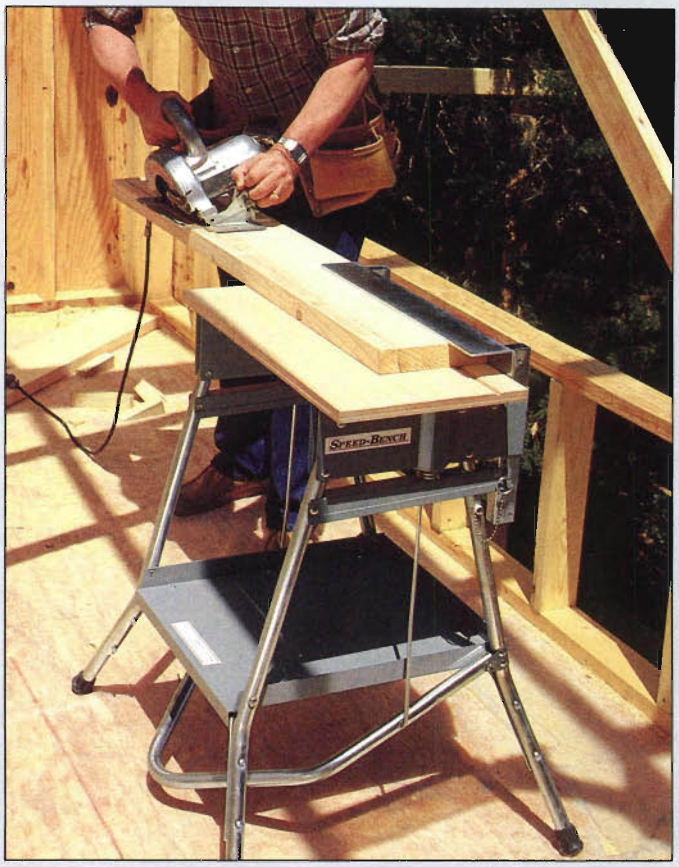
## Bendmaster Laminate Bender

A salesman at Formica once told me that *nothing* will bend Color Core. This brittle, through–color laminate eliminates those unsightly black edge lines that show up in countertop work. When Bendmaster said their gadget would bend solid core laminate, we snickered, but we're not laughing now. Basically, this tool is a high–tech air heater that maintains a super–constant temperature on a metal cylinder. The cylinder contacts the laminate, heating it enough to make it pliable without burning, cracking or splitting. A warning: this device can easily burn you, and don't expect to become an instant expert in laminate bending the minute you turn it on. It requires practice and even more so with through–color laminates. Once you've become proficient, you'll like what this gadget can produce. We know there are diehard blow–dryers out there considering a letter to the editor right now, but note this point — the Bendmaster is better than a heat gun or hair dryer simply because it's stationary and gives you more control over the workpiece. When it's mounted on a bench or wall, you need only grab the ends of the strip and twist it around the heat cylinder until you're satisfied with the bend. A coat of petroleum jelly applied to the strip before bending limits the cracking you can get if you're not an experienced user. ($185.00, Bendmaster Inc., 175 French Hill Road, Wayne NJ 07470. 201-696-0242)



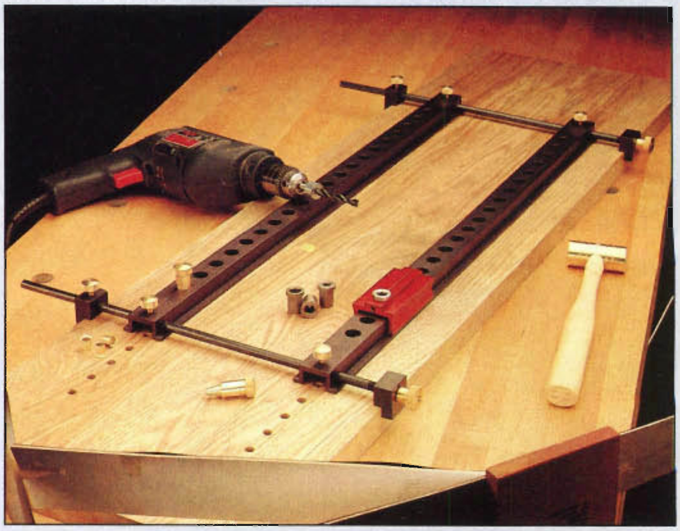
## Speed–Bench

This portable work station features a treadle–operated clamp. It's made mostly of steel with a wood top and a full–length clamp that supplied about 150 pounds of pressure. It will firmly suspend stock as thin as paneling or as thick as 4-1/4". You can tighten down on a 1 X 2 just as quickly as you can clamp a 2 X 12 into position. To operate the clamping mechanism, you step down once on a foot treadle. To release it, just repeat the process. The unit weighs about 42 pounds and it's heavy and stable enough to hold bench–top power tools including miter boxes, scroll saws and bench grinders. Rubber–tipped feet prevent the bench from walking around on hard surfaces during use. The top has a V–groove for clamping round objects. The tool's creator is an avid woodworker who saw the need for this type of gadget, and for under $160, you'll get years of use from it. (Tekton Tools Inc., 9020 Capitol of Texas Highway North, Suite 220, Austin, TX 78759. 800-283-5866)



## Veritas Shelf Drilling Jig

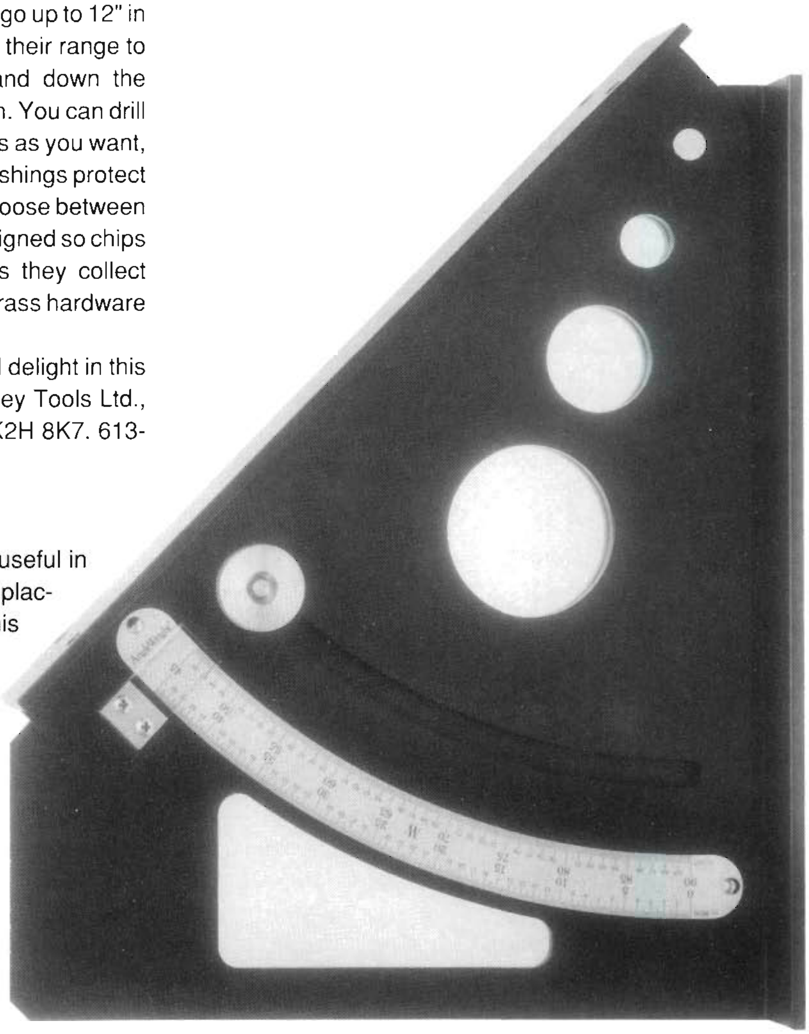
This shelf drilling system indexes perfectly aligned holes for shelf supports, as well as holes required for face doweling. Two extruded aluminum rails ride along two clamps that secure to the



outside edges of your panel. The standard clamps go up to 12" in width, but you can order optional rods that extend their range to 24". By moving the tapered register pins up and down the aluminum rails, the user locates the drilling position. You can drill as many or as few holes for as many shelf supports as you want, and all will be perfectly aligned. Hardened steel bushings protect the rails during the drilling process, and you can choose between five metric and four English sizes. The rails are designed so chips don't disturb the accuracy or drilling process as they collect underneath, and little extras like finely machined brass hardware only enhance the joy of using this unit.

Anyone who does adjustable shelving work will delight in this simple but well–made gadget. ($145.00, Lee Valley Tools Ltd., 1080 Morrison Drive, Ottawa, Ontario, Canada, K2H 8K7. 613-596-0350)

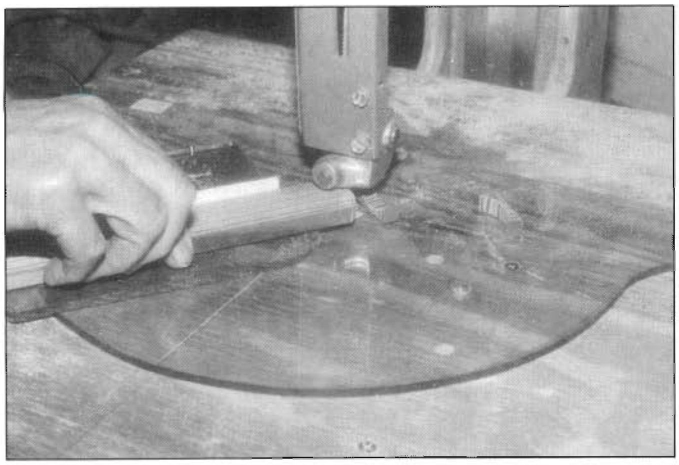
## AngleWright Adjustable Triangle



This gadget is basically a precision protractor useful in applications ranging from setting up machines and placing stock to guiding cuts. What's important about this particular triangle is that it's both accurate enough for drafting applications and tough enough to withstand shop conditions. It's made of high–quality extruded aluminum, nicely fitted with brass hardware. The unit has flanges on both sides that are predrilled so the operator can mount extension boards for large work. You can screw some one–by stock right to those flanges to aid in laying out particularly long work, like table and counter tops. When it comes to scales, the AngleWright retains position well and is easy to read, thanks to a red hairline indicator that gets you down to ten–minute increments. The manufacturer claims accuracy to ± 0.017°, and our machinist felt that the maker was telling the truth. Furthermore, it lived up to the manufacturer's broad spectrum of claims. It's accurate, extremely durable, versatile and a pleasure to use. If all tools were made as well as this one, I'd be out of a job. ($75.00, AngleWright Tool Company, Box 25632, Los Angeles, CA 90025.213-471-7432)

## Arc–Aid Band Saw Jig

This unique radius–cutting jig is made by hand. The gentleman that produces these units works on them one at a time, and though it may take a while to get your hands on one, it's worth it if you do quantity production work using your band saw for radius cuts.



The device is made of several plastic composites including Lexan® for the cradle and linear polyethylene for the base. The hardware consists of a rivet at the pivot point and two wing nuts for the fence that controls the stock. The unit sets up on the band saw table with C-clamps. Once it's in place, you'll need to make several trial cuts in order to arrive at final jig placement. After placing the stock against the cradle (fence) you can make repeat radius cuts knowing that you'll achieve consistent results. If, for example, you want to produce 20 back slats for an Adirondack chair, this gadget will make the task almost simple. After you get the unit in position, you won't need any template, and you'll be ready to knock out one or 1,000 pieces. The initial radius will reproduce with incredible accuracy. The rivet drops into any one of 10 possible pivot holes to determine the size of the radius, and with this amount of flexibility, there's scarcely a radius that you can't achieve. The unit offers a width range of 1/2" to 4", and we found it worked best with blades 1/4" wide or less.

Perhaps our only objection is the insufficiency of the current paperwork. The craftsman who makes this gadget is working on a revision, but the latest manual actually limits the tool's use since it doesn't make its full versatility clear. Still, at $35.00, it's a great bargain even without lengthy instructions. (Don Stutzman, 109 Maxwell Avenue, Johnstown, PA 15904. 814-266-2923)

# Calendar

## Events of Interest to Woodworkers

**If your group is having an event you would like other woodworkers to hear about, please send us all pertinent information at least three months before the opening date. We will publish it for you in *Calendar* free of charge.**

### California

**Wildlife Art Show** (12/6-8) Doubletree Hotel, Palm Springs
**Contact:** John Fairfield, 9340 Gregory St., La Mesa, CA 92042. 619-462-0232

**Harvest Festival 1991 Craft Shows** (12/6-8) LA County Fairgrounds

**No. California Woodworking Show** (12/6-8) San Mateo County Fairgrounds,Fiesta Hall, San Mateo
**Contact:** The Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. 213-477-8521

**Gallery Show:** Lauren Yonan, Vishnu, Dave Peck (thru 12/31)
**Contact:** Made in Mendocino Gallery, 13500 S. Highway 101, Hopland, CA 95449. 707-744-1300

### Connecticut

**Crafts Expo** (12/6-8, 13-15) Hartford Civic Center, Hartford
**Contact:** Art & Crafts Festivals, Inc., PO Box 412, Canton, CT 06019. 203-693-6335

### Maryland

**Crafts Festival** (12/13-15) Montgomery Fairgrounds, Gaithersburg
**Contact:** Sugarloaf Mountain Works, 20251 Century Blvd., Germantown, MD 20874. 301-540-0900

### Minnesota

**Woodworking World Shows** (1/17-19) Minneapolis Convention Center, 1301 S. 2nd Ave., Minneapolis, MN 55403
**Contact:** Woodworking Assoc. of North America, Box 706, Plymouth, NH 03264. 603-536-3876

### New York

**Classes:** (12/2, 7) Routers, (12/11, 14) Woodfinishing
**Contact:** Constantine, 2050 Eastchester Rd., Bronx, NY 10461. 212-792-1600

**Crafts Fair** (12/6-8, 13-15, 20-22) Columbia University/Ferris Booth Hall, 115th St. & Broadway, Manhattan
**Contact:** Matt Alperin, PO Box 889, Times Square Station, New York, NY 10108. 212-695-4465

**Crafts Spectacular**(12/6-8) New York State Fairgrounds, Syracuse
**Contact:** United Craft Enterprises, Box 326, Masonville, NY 13804. 607-265-3230

### North Carolina

**Winter Workshop** (12/16-20) Windsor Chairmaking
**Contact:** Country Workshops, 90 Mill Creek Rd., Marshall, NC 28753. 704-656-2280

**Workshops:** Woodcarving, Woodworking (December)
**Contact:** John C. Campbell Folk School, Rt. 1, Brasstown, NC 28902. 800-562-2440

**Charlotte Woodworking Show** (1/24-26) Charlotte Convention Center, Hall A, 101 S. College St., Charlotte, NC 28202
**Contact:** The Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. 213-477-8521

### North Dakota

**Woodworking World Shows** (1/24-26) Bismarck Civic Center, 6th and Sweet Ave., Bismarck, ND 58502
**Contact:** Woodworking Asoc. of North America, Box 706, Plymouth, NH 03264. 603-536-3876

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**Free:** 50' of hose, 1ea 4" to 3" , 2 ea 4" to 2" adaptors.. **$40Value**
#DC2 ..... **$299.95** (UPS $30)

## Ohio

**Woodworking World Shows** (1/10-12) Veteran's Memorial Hall, 300 W. Broad St., Columbus, OH 43215
**Contact:** Woodworking Assoc. of North America, Box 706, Plymouth, NH 03264. 603-536-3876

**Classes:** Traditional Furniture Building (1/25)
**Contact:** The Hardwood Store, 1813 Dalton Dr., New Carlisle, OH 45344. 513-849-9174

## Oklahoma

**Woodworking World Shows** (1/31-2/2) State Fairgrounds, 500 Land Rush St., Oklahoma City, OK 73147
**Contact:** Woodworking Assoc. of North America, Box 706, Plymouth, NH 03264. 603-536-3876

## Pennsylvania

**Philadelphia Woodworking Show** (1/17-19) Sun Center Complex Auditorium, 63 Concord Rd., Feltonville, PA 19013
**Contact:** The Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. 213-477-8521

## Virginia

**Woodworking World Shows** (1/3-5) Norfolk Scope, on the corner of St. Paul and Brambleton, Norfolk, VA 23501
**Contact:** Woodworking Assoc. of North America, Box 706, Plymouth, NH 03264. 603-536-3876

## Washington

**Gallery Show:** (thru 12/31) Box Competition, (thru 12/31) Children's Furniture & Toys, (1/10-2/29) Rocking Furniture
**Contact:** Northwest Gallery of Fine Woodworking, 202 1st Ave. S., Seattle, WA 98104. 206-625-0542

## Wisconsin

**Milwaukee Woodworking Show** (1/31-2/2) MECCA Convention Hall, Arena Exhibit Hall, 500 W. Kilbourn Ave., Milwaukee, WI 53203
**Contact:** The Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. 213-477-8521

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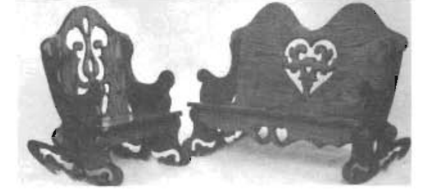

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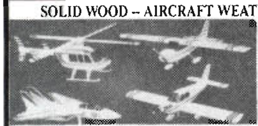

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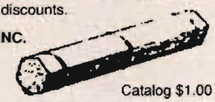

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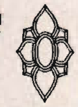

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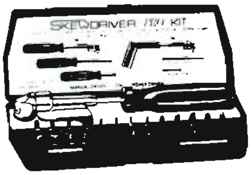

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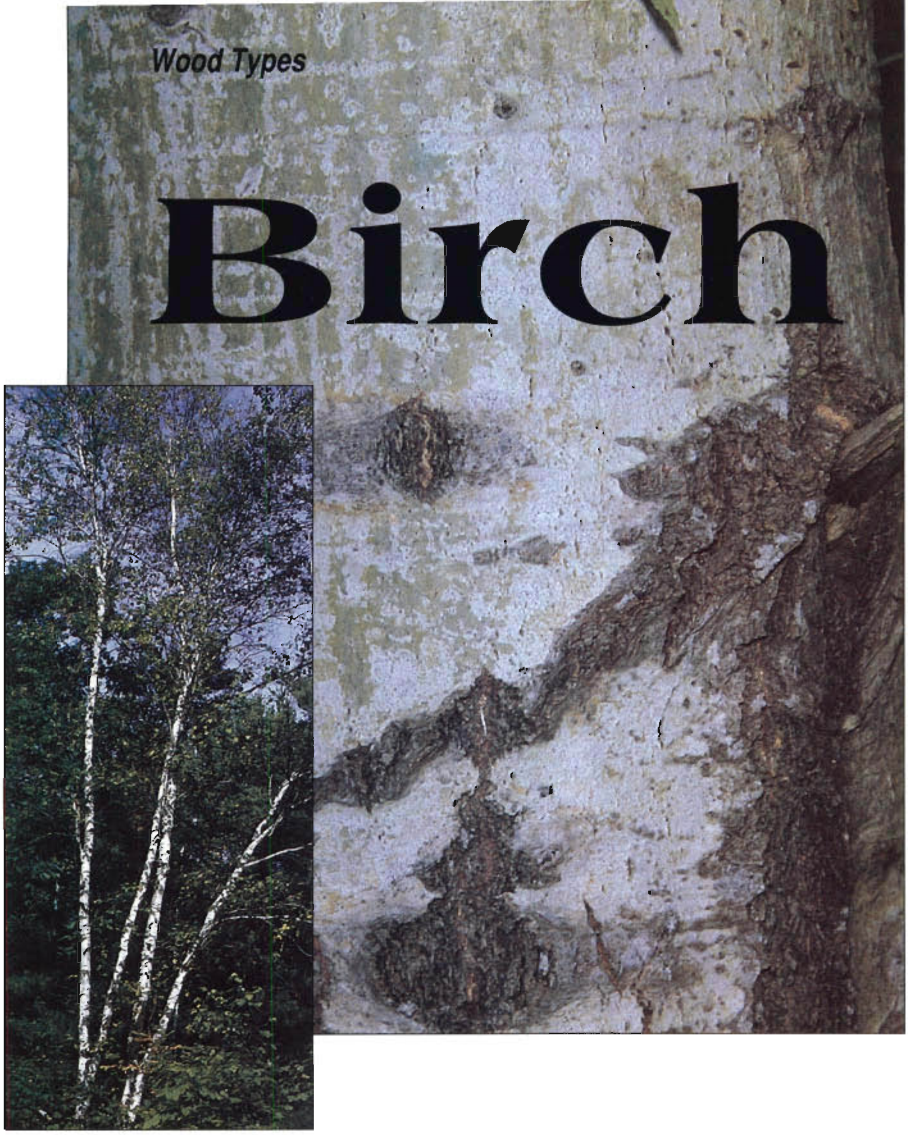
# Birch



### by Ken Textor

Immortalized in the poetry of Robert Frost and easily obtained in most northern lumberyards, birch is an attractive, inexpensive and vastly under-utilized hardwood. Indeed, because woodworkers often overlook it, one of its most common commercial uses is for ordinary wooden novelty items. It's a viable and less expensive substitute for some of the better–known hardwoods. As with all woods, though, it has its limitations. Once you get to know them, you might find birch a very useful woodworking medium.

## General Description

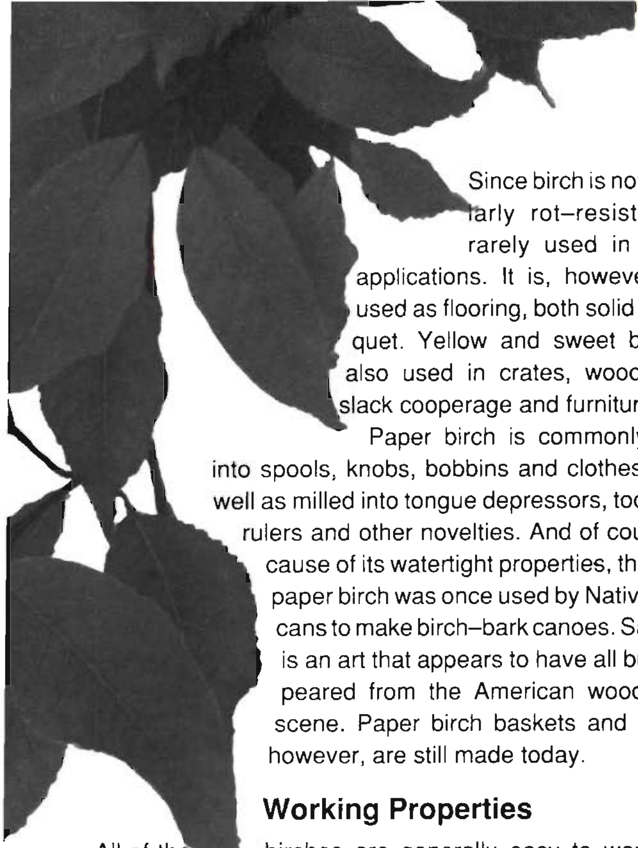
There are at least six distinct species of birch that normally find their way into the commercial lumber pipeline. There are dozens more as ornamentals. All are sold under the general heading of birch—the Latin genus *betula*. Paper birch (*betula papyrifera*) and yellow birch (*betula alleghaniensis*) are the heavy hitters in the lumberyards of the Northeast and Midwest, along with sweet birch, also known as black or cherry birch. Through the Appalachians as far south as Georgia, river birch, gray birch and western paper birch are also cut in commercial harvesting operations.

This mix of species makes it a little tough to pin down exactly what you'll get when you buy birch. For instance, the heartwood of yellow birch is light reddish–brown while the heartwood of sweet birch is dark brown with a hint of red. Most birches have plenty of white to cream–colored sapwood which usually goes into veneers and plywood. But sapwood can also comprise a large portion of ordinary lumber.

The strength, weight and hardness of birch vary, too. Paper birch is considerably less hard and strong than yellow birch. Paper is comparable to poplar (see *Popular Woodworking* #52), and yellow has properties nearer to maple (*Popular Woodworking* #60). Sweet birch is somewhere in between. The other birches are fairly hard and strong, much like sweet birch.

Fortunately, all birches have fairly straight grain and very good turning properties, which account for its popularity in commercially turned novelties. The wide variation in color is one of the reasons why birch is not frequently found in furniture made in this country. In Canada, however, where birch is a predominant commercial species, the variations in color are looked upon as an advantage, and birch is often used in furniture—sweet and yellow birch in particular.

Shrinkage and swelling can be a problem. Birch will shrink volumetrically at a much greater rate than maple or poplar. This means it must be well–dried in a kiln before you use it in projects like furniture, where tight joints are important. The bending properties of freshly cut birch are good. It's generally free of splitting and can be worked into fairly tight curves. Once kiln dried, however, birch loses its easy–bending qualities.



Since birch is not particularly rot–resistant, it's rarely used in exterior applications. It is, however, often used as flooring, both solid and parquet. Yellow and sweet birch are also used in crates, woodenware, slack cooperage and furniture.

Paper birch is commonly turned into spools, knobs, bobbins and clothespins, as well as milled into tongue depressors, toothpicks, rulers and other novelties. And of course, because of its watertight properties, the bark of paper birch was once used by Native Americans to make birch–bark canoes. Sadly, this is an art that appears to have all but disappeared from the American woodworking scene. Paper birch baskets and buckets, however, are still made today.

## Working Properties

All of the birches are generally easy to work. Their straight grain makes planing virtually problem–free. Dull planer blades may burn the wood a bit, particularly in paper birch which burns very easily. With sharp planer blades, however, there's no burning and sanding time is significantly reduced.

Sanding birch is a pleasure—all have a sweetish smell when planed or sanded, particularly sweet birch. In addition to its sweet wintergreen smell, it can be polished to a very attractive finish. Birch is polished by using increasingly fine sandpaper, ending with 600–grit or so. The resulting surface looks as though it already has an antique or semi–gloss finish on it. All the birches resist sanding dips very nicely.

In turning birch, the waste tends to come off in fine sawdust, rarely in chips or big chunks. Therefore you can obtain very fine variations in shape. Moreover, if you use sharp turning chisels, sanding time is greatly reduced when compared with woods like oak and poplar.

Fastening and gluing the birches are generally problem–free processes too, provided you take into account the shrinkage problem. Screws and nails need a pilot hole drilled first. It should be of the correct size—or the nail will bend or the screw head turn off. Filling the counterbored hole with a plug requires some extra attention because of the color variations. Gluing birch with either epoxies or standard yellow glues presents no special difficulty.

## Finishing

Unless you get birch lumber with a uniform color, I've found it's best to stay away from stains. It takes a lot of experimenting to figure out exactly what the results will be with a given stain. Even then, you might get a surprise or two.

The new clear water–based polyurethanes look particularly good on birch. They let the natural coloring show through without any of the yellowing that oil–based polyurethanes often produce over time. That yellowing is particularly noticeable on the white surfaces of birch.

If you do use the polishing approach for sweet or yellow birch, the sheen can be maintained just by using a clear wax finish after the last sanding. Butcher's wax is often good here. Tung oil is always a fine finish on birches, too.

## Availability

The availability of birch is very good in the Northeast, Canada and the Midwest—any location east of the Mississippi. On the West Coast, it may be very hard or expensive to get.

Prices run from $1.25 to $2 per board foot for rough dimensional lumber. It's commonly available in planks one to two inches thick, in widths up to twelve inches and lengths up to sixteen feet. Larger dimensional stock is rare. Plywood made of birch is also reasonably priced, as are veneers. Both cabinet grade and construction grades of birch plywood are usually available, too.

I know of no commercial outlet for the bark of paper birch. But if you want to experiment with making a bucket or basket out of the stuff, try asking a woodlot owner (myself included) if you can strip a piece off a standing birch. Stripping is best done in the spring when the bark is most pliable, and it might be a fun project to pursue after a long winter in the shop. PW

by Charles Day

# "Doc, I've Got This Pain Here"

I wonder how my doctor feels when he's just relaxing, maybe about to cast that new fly far out across the lake, and he hears "Hey doc, I've got this pain here!" Does he think, "Not another patient, I'm off duty!" or does he jump instantly, ready to aid someone in need? Whatever his response, I'm sure it's a situation he's had to learn to handle. Something similar happens fairly often to me—and maybe to you.

I make an acquaintance who, after discovering that I'm a woodworker, inevitably says, "I've got this piece of furniture that was my grandmother's, and I wonder if you could look at it and tell me what it would take to refinish it?" Or even worse, "You're a carpenter, build this doghouse for me." A professional woodworker might handle this by saying that he's not a carpenter, or that he would be glad to submit a bid for refinishing grandma's furniture. But I'm not a professional and I work wood for my own enjoyment, so I've had to learn to deal with these situations a bit differently.

It's not that my friends won't offer to pay me for my work. It's just that if I charged them enough to be worth all the hours I spend, they'd think I was gouging them. In general, people don't realize how much time and effort it takes to complete even the simplest project. I know of one woodworker who spent hours making a key holder. He completed it with a natural finish that gave it a simple but very attractive appearance. On the open market the item might sell for about fifteen dollars, but it was worth much more considering his time and effort. He gave it to his sister for Christmas, who didn't like the color and promptly painted it orange!

Then there's the woodworker who spent hours carving a bird figure to give to his brother's wife—only to have it given back to him ten years later as a Christmas gift. She'd forgotten who gave it to her and thought that her woodworking brother-in-law would appreciate it!

It's no wonder that the work I do for my friends is usually done for little or no charge. Of course, if I need a favor from them one day, I won't hesitate to ask.

My criteria for accepting woodworking tasks from my friends and acquaintances is this: does the project intrigue me; does it bring challenges that dare me to try to gain new skills? Will the person appreciate the project or will they quickly lose interest in it? Do they understand how much time, effort and skill will go into the making of the project? And finally, will the project represent my work in a professional way? For example, a friend wanted to have his initials inlaid in four separate places on a lamp. Initials to me sometimes tend toward the tacky, so I had to figure out a stylish way of meeting his wishes while at the same time maintaining my artistic integrity—that was the challenge. I convinced my friend that one stylized initial was all that was needed and the project turned out well.

What I'm looking for in my work is just a little magic—the magical feeling of satisfaction. It's there in that project that I can't figure out how to build and then somehow do. It's in the all-consuming energy that overcomes me and won't give me rest during each phase of the project until at last it's completed. It's in the pride that I feel each time I see my work and admire it. I'm not tremendously vain, I'm just continually amazed at the beauty of the wood I work, and that I could have created something so beautiful from such basic stuff.

Well, now that I've stated all my definitive personal criteria for accepting woodworking projects, I have to go refinish a boring bedroom suite for my mom. But remember—the next time a patient pesters me—or you—with "Doc, I've got this pain here," I know what we're going to say. "Make an appointment and take a number. The doctor is not in!" PW

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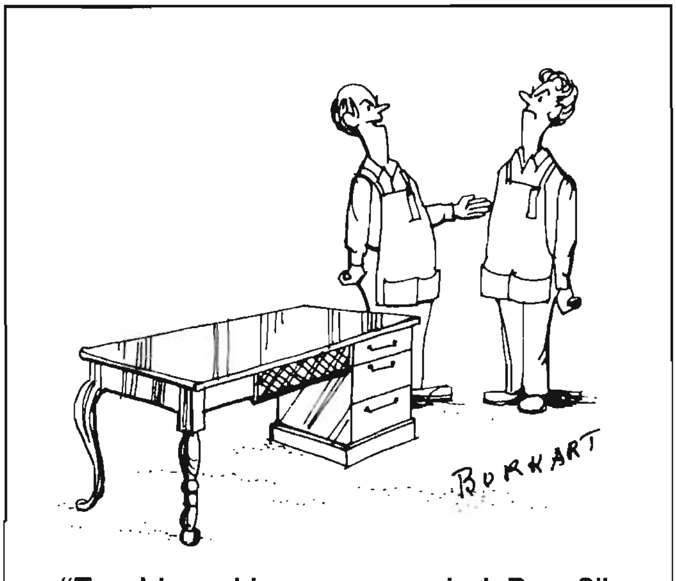
***Charles Day** hails from Greenville, Texas.*



**"Trouble making up your mind, Dave?".**

After cutting pieces from a gummy 2 X 4 on my table saw, I returned to my bench. Suddenly I heard a high-pitched whine, the one you get when the whirling blade is kicked by an exiting cutoff.

I'd already shut off the saw, so why the singing? I looked and saw the blade was at rest. I tentatively reached out and touched it to dampen any vibrations. There were none. The screaming continued.

"Must be something underneath," I reasoned, and dropped to my knees to peer up at the netherside workings. I poked and peered and still the howling continued. Just as I was about to give up and start screaming, too, I noticed the ceiling above the saw. There, screeching with all its might was the smoke alarm I'd installed the day before. —Bill Rolke

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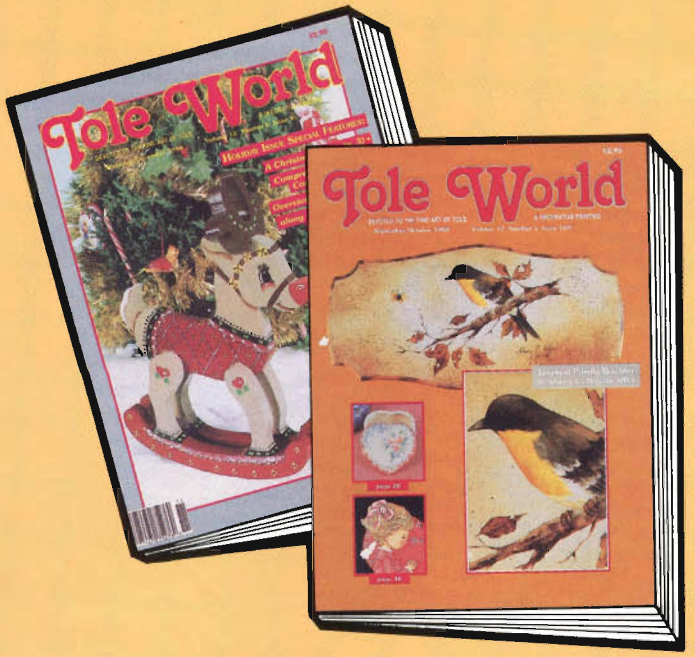

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